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INSTRUCTION MANUAL

for

MODULE HOUSING ASSEMBLY

MODEL GMA

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INSTRUCTION MANUAL

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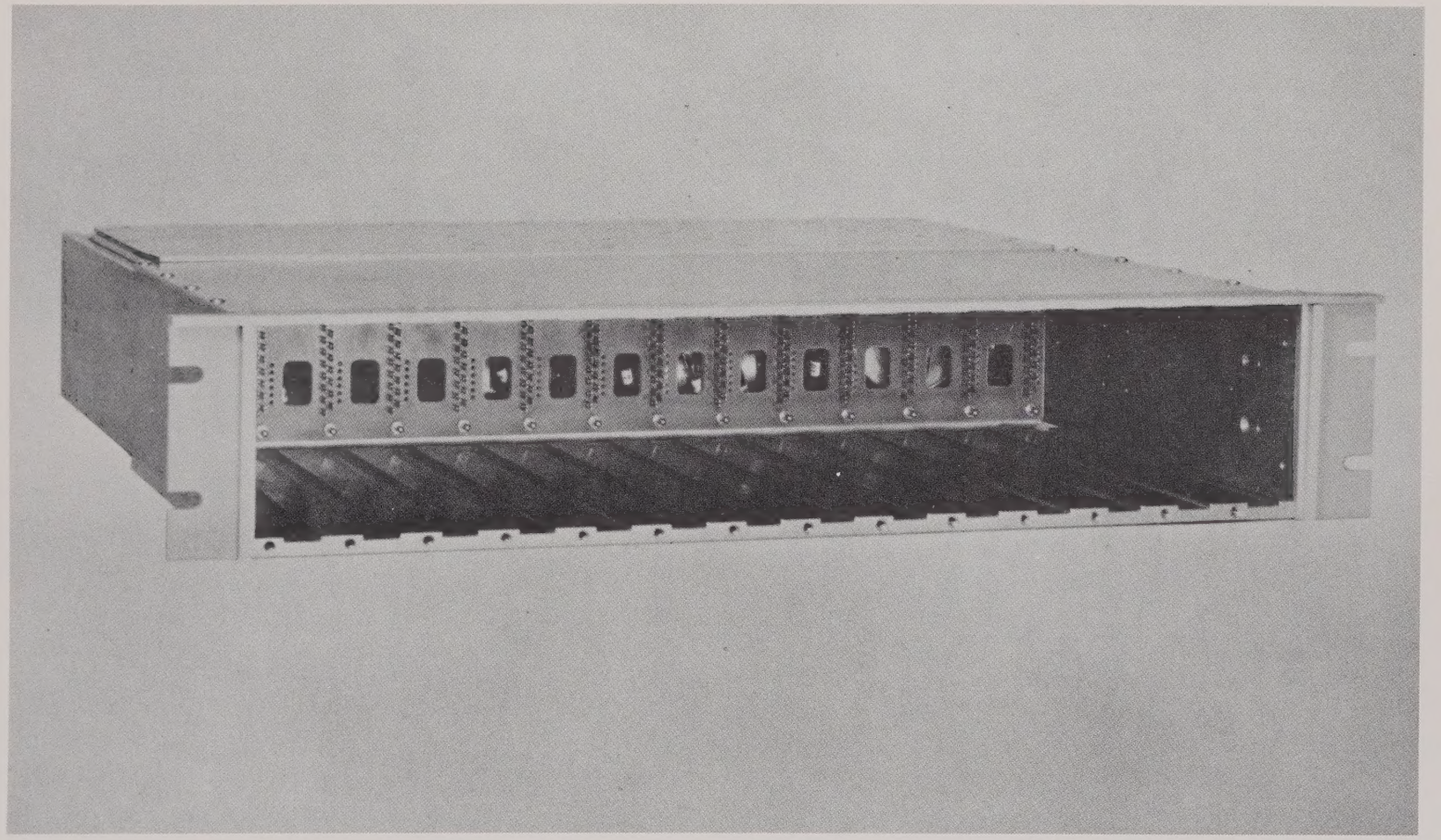


Figure 1-1. Module Assembly, Model GMA

SECTION I

DESCRIPTION AND LEADING PARTICULARS

1-1. PURPOSE AND SCOPE.

1-2. This publication contains a general description with installation and maintenance instructions for the GMA Module Assembly, Figure 1-1, designed and manufactured by Data-Control Systems, Inc., Commerce Drive, Danbury, Connecticut.

1-3. A general discussion of the electrical and physical characteristics and a functional description referencing a block diagram and a schematic drawing is covered in Section I. Details regarding installation are given in Section II. Section III covers general maintenance, troubleshooting, and location of parts. Operation is not included since it requires only the activation of a power switch.

1-4. MODULE ASSEMBLY.

1-5. The Module Assembly accommodates modular type data handling units for installation in standard 19 inch racks. Within the housing, mounting space for 14 single or 7 double modules in any combination is provided. Special configurations and arrangements of different type modules housed in the assembly must be prewired. The power supplies and blower assembly are an integral part of this equipment.

1-6. PHYSICAL CHARACTERISTICS. The forward section of the housing is grooved on the upper and lower inside edges permitting perfect alignment between the data handling module connector and the Elco and guide pins mounted on the housing masterboard connector. Each housing masterboard station may be prewired for any module assigned, adding flexibility to the arrangement of the data handling modules used. Fourteen screw holes are placed along the lower edge of the housing mouth to accommodate the captive screws used to lock each data handling module in place.

1-7. Power supply, blower assembly and interconnecting wiring occupy the rear section. The power supply is mounted on the lid and

may be removed by unfastening fourteen screws around the outside of the rear cover (see Figure 1-2). A keyed pigtail plug (RF-11224) connects to the power supply so that the unit may be entirely removed from the housing permitting access to all wiring within the frame and power supply. The power connector, a fuse, a power ON-OFF switch, and individual input and output connectors are mounted on the rear wall of the frame to facilitate interconnection between other ground data handling equipment. All connectors are designated.

1-8. Dimensions are 19" x 3.5" x 18.38" and the unit weighs 17 pounds.

1-9. Chassis is light gold. Trim is brushed aluminum.

1-10. ELECTRICAL CHARACTERISTICS. Power Supplies are connected to all modular connectors with separate shielded connections.

1-11. There are two Power Supplies available, Model 306-T and GMA Power Supply. Table 1-1 lists the voltage and current capabilities of each supply.

Table 1-1. Voltage/Current

Model DCX-6B		GMA Power Supply	
Voltage	Current	Voltage	Current
+12 Vdc	560 ma	+12 Vdc	250 ma
-12 Vdc	560 ma	-12 Vdc	250 ma
+35 Vdc	420 ma	+35 Vdc	150 ma
-35 Vdc	560 ma	-35 Vdc	150 ma
+18 Vdc	1.4 amps	+18 Vdc	750 ma
-18 Vdc	1.4 amps	-18 Vdc	750 ma

1-12. POWER REQUIREMENTS. 105 to 125 vac, 55 to 65 cps, single phase.

1-13. CONNECTORS. Each Model GMA Housing contains one Module Masterboard Connector (DCS Type DA-009-058) consisting of 14 sets of 20 pin Elco Type CS-20-P-100-5203 connectors on a common printed

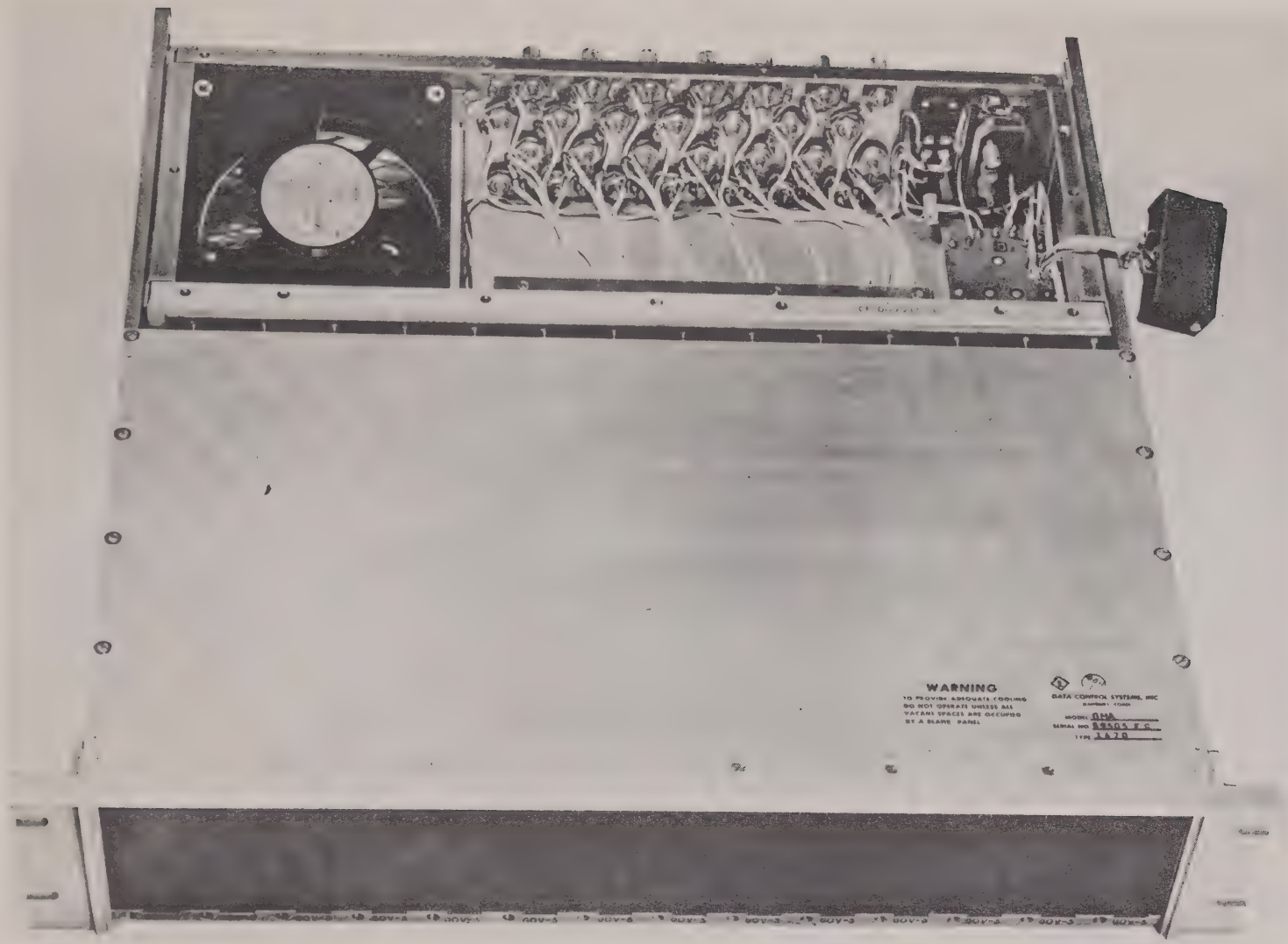


Figure 1-2. Module Assembly with Power Supply removed

circuit board. The rest of the connectors with military type designations and/or manufacturer's numbers are listed in Table 1-2.

Table 1-2. Connectors, GMA Housing

Model	Power	Signal
GMA-1	Cannon #DPX-25C3-34P-1A - 25-pins and 3 coaxial leads (J15) Mating Connector: Cannon #DPX-25C3-33S (P15)	Up to 14 Amphenol #UG-126-216, 5-pin, Low Frequency, Input/Output Connectors - Mate with Amphenol #126-223 - Up to 14 Amphenol #UG-697/U miniature coaxial bulkhead connectors - Mate with either Amphenol #UG-692/U whenRG-59 or RG-62 cable is used; or with Amphenol #UG-699/U when RG-55 or RG-58 cable is used - For BNC terminated cables, use Adaptor #UG-690/U (Optional - not supplied as part of GMA-1).
GMA-3	Cannon #DPX-25C3-34P-1A - 25-pins and 3 coaxial leads (J15) Mating Connector: Cannon #DPX-25C3-33S (P15)	Up to 28 #UG-657/U Input/Output BNC Bulkhead Connectors - Mate with #UG-260/U when RG-59 or RG-62 cable is used; or with #UG-88C/U when RG-55 or RG-58 cable is used.
GMA-5	Hubbell Twist-Lock #7486-G (J15) Mating Connector: Hubbell #7484 (P15)	Up to 28 #UG-657/U Input/Output BNC Bulkhead Connectors - Mate with #UG-260/U when RG-58 or RG-62 cable is used; or with #UG-88/U when RG-55 or RG-58 cable is used.
GMA-5T	Hubbell Twist-Lock #7486-G (J15) Mating Connector: Hubbell #7484 (P15)	Up to 14 Twinaxial Input BNC Bulkhead Connectors, Trompeter #BJ-77 - Mate with Trompeter #PL-75 for use with Belden #8422 cable - Up to 14 Output BNC Bulkhead Connectors #UG-657/U Mate with #UG-260/U when RG-59 or RG-62 cable is used; or with #UG-88C/U when RG-55 or RG-58 cable is used.
GMA-6	Power Supplied By Molded Spiral Power Cord Entering Housing Through Strain Relief	Up to 14 Twinaxial Input BNC Bulkhead Connectors, Trompeter #BJ-77 - Mate with Trompeter #PL-75 for use with Belden #8422 cable - Up to 14 Output BNC Bulkhead Connectors #UG-657/U Four BNC Bulkhead Connectors for Auto-Cal talkback - Mate with #UG-260/U when RG-59 or RG-62 cable is used; or with #UG-88C/U when RG-55 or RG-58 cable is used - Two 24-pin Amphenol #57-40240 Blue Ribbon Connectors for Auto-Cal wiring - Mate with Amphenol #57-30240.

Table 1-2. Connectors, GMA Housing (cont)

Model	Power	Signal
GMA-7	Hubbell Twist-Lock #7486-G (J15) Mating Connector: Hubbell #7484 (P15)	Up to 14 Internal Low Noise Selectro Connectors #52-009-4220 with Microdot Cable #50-3804 are available to mate with GCA-1 and GOC-5 input connectors. These connectors are wired to Dage #30728-1 Low Noise BNC Bulkhead Connectors - Up to 14 Output BNC Bulkhead Connectors #UG-657/U - All BNC Bulkhead Connectors mate with either #UG-260/U when RG-59 or RG-62 cable is used; or with#UG-88C/U when RG-55 or RG-58 cable is used.
GMA-8	Power Supplied By Molded Spiral Power Cord Entering Housing Through Strain Relief	Up to 14 Internal Low Noise Selectro Connectors #52-009-4220 with Microdot Cable #50-3804 are available to mate with GCA-1 and GOC-5 input connectors. These connectors are wired to Dage #30728-1 Low Noise BNC Bulkhead Connectors. Up to 14 Output BNC Bulkhead Connectors #UG-657/U. Four BNC Bulkhead Connectors #UG-657/U for Auto-Cal talkback. All BNC Bulkhead Connectors mate with either #UG-260/U when RG-59 or RG-62 cable is used; or with #UG-88C/U when RG-55 or RG-58 cable is used - Two 24-pin Amphenol #57-40240 Blue Ribbon Connectors for Auto-Cal wiring - Mates with Amphenol #57-30240.
GMA-9	Power Supplied By Molded Spiral Power Cord Entering Housing Through Strain Relief	Up to 14 Twinaxial Input BNC Bulkhead Connectors, Trompeter #BJ-77 - Mate with Trompeter #PL-75 for use with Belden #8422 cable - Up to 14 Output BNC Bulkhead Connectors #UG-657/U Mate with either #UG-260/U when RG-59 or RG-62 cable is used; or with #UG-88C/U when RG-55 or RG-58 cable is used - Two 24-pin Amphenol #57-40240 Blue Ribbon Connectors for Calibration wiring - Mates with Amphenol #57-30240.

NOTE

Input/Output Connectors are supplied only for use with wired positions unless otherwise specified. Unused connector holes will be covered with removable plugs providing future expansion capability.

1-14. CONTROLS AND INDICATORS. Fuse (312-3AG-1, 1/2 amp, 250 V) is located at rear of chassis. Power is applied by connecting power input line to a-c source and placing the power ON-OFF switch in the ON position.

1-15. FUNCTIONAL DESCRIPTION.

1-16. A functional description will be given of the GMA Power Supply, and then a functional description of the Model 306-T.

1-17. GMA POWER SUPPLY. The function of the GMA Power Supply is to provide six power supply voltages with overload protection for the modules accommodated within the housing. Rectification of line voltage, series regulator, d-c to d-c conversion, filtering and overload protection are accomplished through the configuration shown in block diagram, Figure 1-3.

1-18. In some Module Assemblies RF1 filters are employed at the power input to attenuate radiation encountered in installations using RF links, etc. as well as internal spikes and spurious components coming from limiters and other circuitry which may effect adjacent equipment through the line. The RF1 package is located near the power connector and consists of L601, L602, between the power input and chassis ground.

1-19. RECTIFIER. The line voltage source applied to the primary of T102 is induced into the secondary appearing across the full-wave bridge rectifier made up of CR401, CR402, CR403, and CR404 (DW-010873). Pulsating d-c is filtered by capacitor C401 and the smoothed output is fed to the emitter of series regulator Q305 via CR405.

1-20. REGULATOR. The regulator may be visualized as a variable series resistor acted upon by the regulator control circuit to increase or decrease the amount of voltage to the DC to DC Converter. Thus, power into the Converter is adjusted to hold the +35 volt supply to within ±1%.

1-21. An increase in the +35 volt supply causes a corresponding increase at the base of Q201. Since the emitter is held at a reference zener voltage, a rise in volts at the Q201 base results in increased

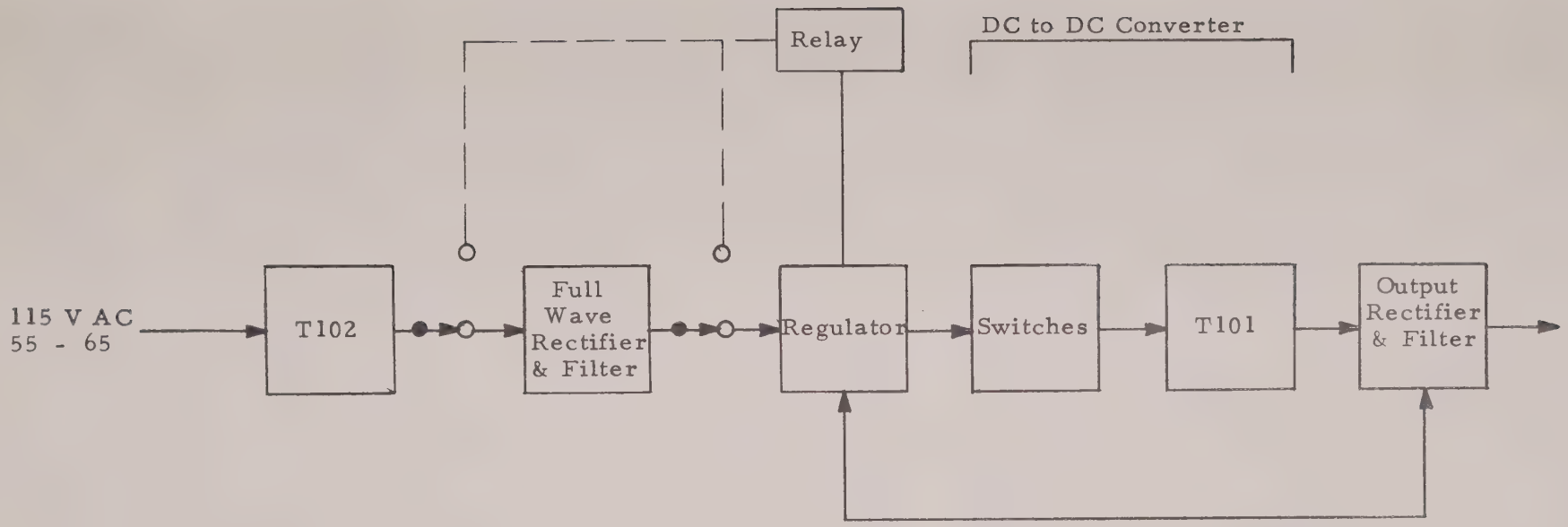


Figure 1-3. Module Assembly Power Supply, GMA

current through Q202 and R208. The positive increase in voltage at the base of Q301 decreases the current through series regulator Q301 and Q305 reducing the voltage at the DC to DC Converter resulting in a decrease in voltage at the +35 volt supply.

1-22. A decrease in voltage at the base of control transistor Q201 causes the opposite effect.

1-23. In the event a short is placed across any supply, the voltage at the input to the DC to DC Converter increases in an effort to maintain +35 volts. Increase in voltage is detected by a comparator transistor connected between a divider (R214, R213 and zener CR208) and the reference voltage a zener CR207. When voltage rises Q203, which is normally off, begins to conduct and in turn causes Q204 to conduct hard energizing relay K301. When energized the relay opens the contacts connecting the input rectifier to the series regulator and will remain energized until the voltage across capacitor C401 discharges sufficiently to permit the relay to return to normal position. The sequence will recycle if the short has not been removed.

1-24. DC TO DC CONVERTER. The DC to DC Converter is driven by the series regulator Q301 and Q305 and consists of a square loop toroid with switching transistors Q302, Q303, and Q304. Assuming one transistor switch is open and the other shorted, voltage is applied to the winding via the center tap that is grounded through the shorted transistor switch. Voltage across the winding causes the flux to integrate until it reaches saturation, at which time the windings connected to the base of Q302, Q303 and Q304 have an induced voltage on them, turning off the transistor that was on and turning on the transistor that was off. Q302 drives Q303 into saturation. The oscillation free-runs at approximately 2KC. Square waves are transformer coupled to the bridge rectifier to yield desired supply voltages.

1-25. OUTPUT RECTIFIER. The square wave voltage induced into the secondary of T101 is full-wave rectified for each required supply voltage. Square waves applied to the rectifiers have fast rise times and the ripple voltage contains high frequency components which are filtered out by RLC circuitry.

1-26. A 2 KC filter placed between the -35 V power supply and ground attenuates components generated by switching transistors Q303 and Q304 which are caused to free-run at this frequency to convert DC to AC. When unfiltered this AC component noticeable effects the wow and flutter circuitry which ultimately distorts the tape speed correction signal fed to demodulators during magnetic recording or playback. The 2 KC filter is a piggyback card consisting of L501 and C501 located beneath the can in the power supply, (see Figure 3-2).

1-27. MODEL 306-T. The function of the Model 306-T Power Supply is to provide six power supply voltages of a higher power rating than the GMA Power Supply. The line voltage is rectified, filtered, regulated and is overload protected in a conventional manner. Figure 1-4 is a simplified block diagram of one voltage, a typical example of Model 306-T operation.

1-28. RECTIFIER. There are four full-wave rectifier circuits (see Schematic 9043). Two full-wave bridge circuits, CR1, CR2, CR3, CR4, CR5, CR6, CR7, and CR8 are used to provide the six output voltages. The two conventional full-wave circuits, CR9, CR10, CR11 and CR12 are used, in conjunction with zener diodes CR13A and CR14A, as part of the voltage regulation system.

1-29. REGULATOR. The regulator transistors Q1, Q6, Q20, and Q29 are the series regulating transistors for ±35 Vdc and ±18 Vdc. They also provide current for Q11 and Q25 which are the series regulators for ±12 Vdc.

1-30. As an example of voltage regulation, consider an increase in the +35 Vdc. The base of Q3 goes more positive causing an increase of current through this transistor. The collector of Q3 becomes more negative, reverse biasing Q2. The emitter of Q2, following its base, increases the negative bias on Q1 which in turn increases the voltage drop across Q1 thereby lowering the output voltage.

1-31. Voltage regulation of the five other voltages is accomplished in the same manner.

1-32. SHORT CIRCUIT PROTECTION. The regulating circuits contain provision for protection in the event of a short across one of the outputs.

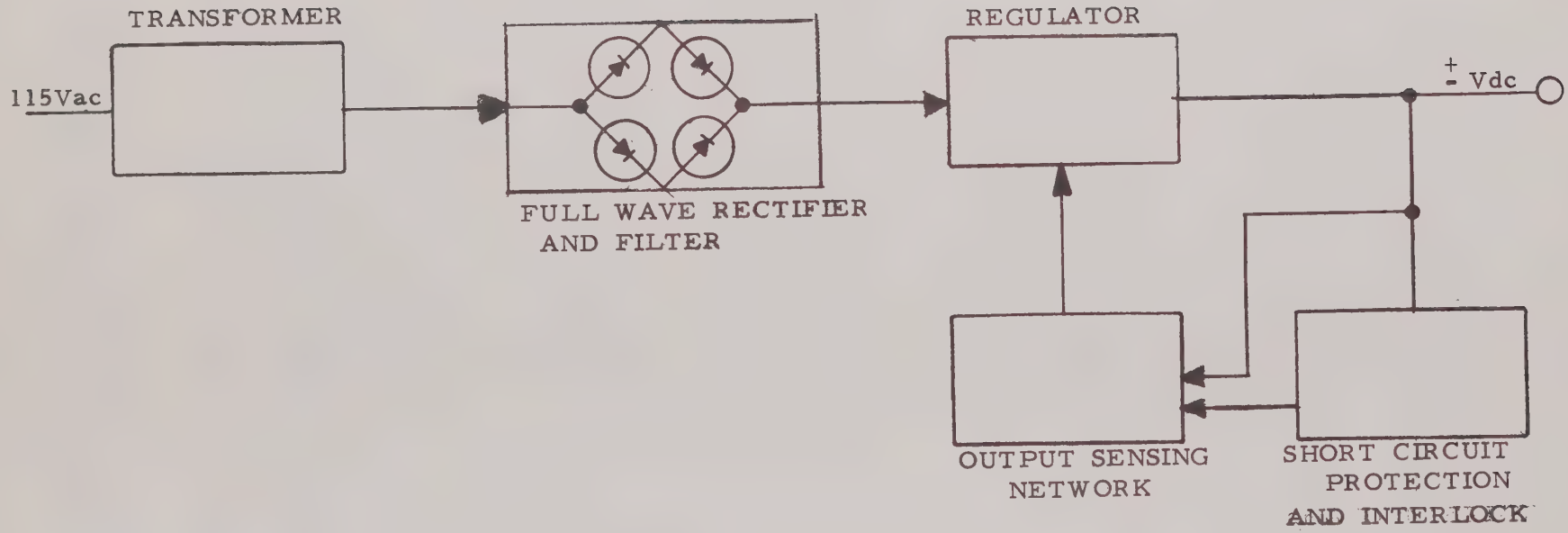


Figure 1-4. Typical Power Supply Section, 306-T

1-33. Consider the example of -18 V being shorted to ground. The voltage drop across R16 increases the bias on Q21 forcing the collector of Q21 to move in a positive direction. This causes Q18 collector to go more negative moving Q19 and Q20 to cut off reducing or eliminating current flow through Q20.

1-34. Consider, again, a shorted +35 Vdc. The voltage drop across R5 will cause Q4 to conduct. Conduction of Q4 will reduce the drive to the series pass network, thus reducing the output. During the short circuit condition, diode CR34 shorts the +18 V supply and collapses the +12 V supply.

1-35. Short circuit protection of the other circuits is accomplished in the same manner.

1-36. All voltages are tied together electronically, therefore, when one is short circuited, all six voltages will collapse.

1-37. Zener diodes CR18 and CR19 associated with Q10 and CR27 and CR28 associated with Q22 are connected such so that if any supply is shorted to any other supply Q10 or Q22 will drive its respective regulating circuit to cut off.

SECTION II

INSTALLATION

2-1. GENERAL.

2-2. This section describes the initial procedure required to install the unit in the rack and prepare the Module Assembly for operation.

2-3. UNPACKING AND HANDLING.

2-4. The unit is sealed in a moisture proof polyethelene bag and wrapped in Kimpack insulation to absorb shock during shipment. Remove the corrugated carton and protective covering and perform a general visual inspection. Retain carton and covering until inspection is completed.

2-5. MOUNTING.

2-6. The Module Assembly may be stationary or slide mounted. Place the unit in the rack and fasten the front panel edges to the frame with four screws. Holes are provided in each side of the chassis for cases where more than one unit is used and the combined equipment must be strapped.

2-7. Engage power plug P15 with connector receptacle J15 which is mounted at the left rear side of the Module Assembly.
Interconnect input and output cables as described and insert the data handling modules into the mouth of the Module Assembly at their proper locations. Insert the power cord into the line source, place the power ON-OFF switch in the ON position and the equipment is ready for operation. For complete connector information, refer to Section I and to the type drawing for the modular assembly in use.

2-8. COOLING.

2-9. Cooling within the rack is an important consideration whenever stability is a critical factor. Environmental requirements acceptable for general purpose types of equipment are too broad and are not within the preferred temperature areas of this equipment. To attain proper cooling, racks must be pressurized.

2-10. Cooling is usually accomplished through a blower assembly located in the base of the cabinet. Adequate pressure is obtained by plugging all vents, screw holes and cracks and directing the flow of air through the module case and out through the crevices in the front panel (see Figure 2-1). Each GMA Module Assembly is also equipped with a muffin fan which pressurizes the housing to 0.2 inch of water and forces air over the units in the Module Assembly. Where ambient temperature does not exceed 40°C the muffin fan is adequate to maintain the necessary temperature within the GMA while it is being operated out of the rack.

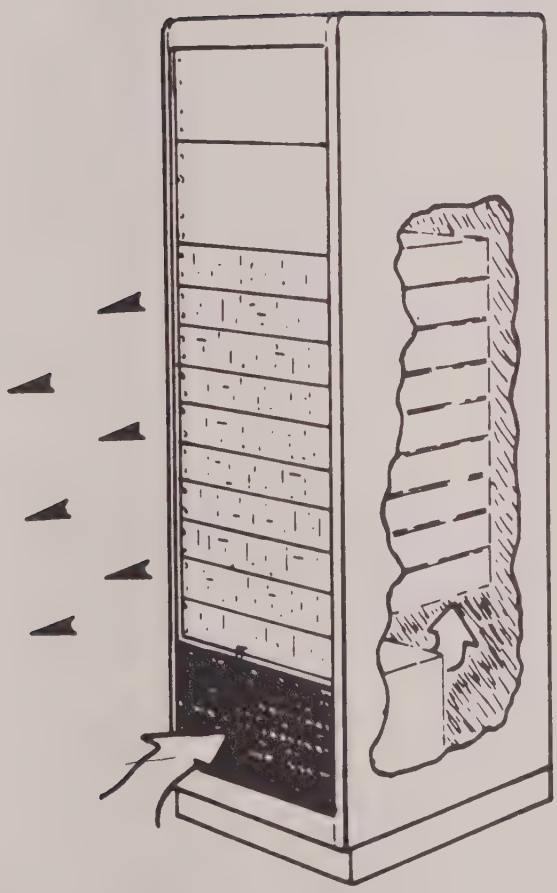
2-11. When the GMA is positioned in the rack, it is impossible to determine whether or not the muffin fans are operating with the main blower turned on. Energize all fans independently to assure they are operating. If the system is interlocked so that fans cannot be energized separately, bypass the switch.

2-12. Interconnection cables which are neatly grouped and arranged will also enhance the cooling problem since any blockage will decrease the rate of cooling air. As air constantly flows through the equipment, the main blower should always be properly filtered. If the rack heats up, although pressurized, and normal operation cannot be attained, replace the blower assembly filter even though it appears to be serviceable. Moreover, it is recommended that the bottom of the rack be cleaned periodically with a standard vacuum cleaner. Module covers may be cleaned with Carbon Met or any suitable solvent.

2-13. LUBRICATION. If the GMA Module Assembly is used in temperatures exceeding 110°F or in areas of severe vibration, the muffin fan should be lubricated at least once a year to ensure reliable performance.

NOTE

A hypodermic type oil injector must be used to lubricate the fan. To inject the oil, pierce the label and concealed self-sealing rubber cap located under the label.



Air flow is 40 cfm per GMA . Installation shall be semi-pressurized to approximately 0.2 in. of water to permit cooling by air flow over and around units.

Figure 2-1. Typical Example of Rack Cooling

SECTION III

MAINTENANCE

3-1. GENERAL.

3-2. This section contains the procedures for preventive maintenance and troubleshooting of the GMA Power Supply and Model 306-T. Included are a list of test equipment and references to drawings required to maintain and repair this equipment. All schematic and assembly drawings are contained in Section IV.

3-3. TEST EQUIPMENT.

3-4. Test equipment for testing and repairing the GMA Power Supply and the Model 306-T Power Supply is listed in Table 3-1.

Table 3-1. List of Test Equipment

Nomenclature	Characteristics
Power Supply	Power Designs, Model 4005K or equivalent
Digital Voltmeter	Electro-Instruments #4010 or equivalent
Oscilloscope	Hewlett-Packard 130B or equivalent
VOM	Simpson, Model 260 or equivalent

3-5. PREVENTIVE MAINTENANCE.

3-6. VISUAL INSPECTION. Remove the Power Supply used from the GMA. Inspect all sub-assemblies for physical damage such as broken or leaking components, burned or charred spots on components and loose or oxidized soldered wires.

3-7. CLEANING. Since cooling air is constantly flowing through the equipment, the main blower rack should be properly filtered. The rack should be cleaned periodically with a standard vacuum cleaner. Panel and covers may be cleaned with a solvent. Interior parts must be air blown.

3-8. TROUBLESHOOTING.

3-9. Troubleshooting the GMA will be confined mainly to troubleshooting the GMA Power Supply or the Model 306-T Power Supply. Troubleshooting the GMA Power Supply will be discussed first and then the Model 306-T.

3-10. GMA POWER SUPPLY. When troubleshooting or replacing components, refer to the schematic drawing DW 010873 and Figures 3-1 and 3-2 which call out the primary components used in the equipment. A replacement parts list is shown in Table 3-2.

NOTE

Initial Adjustment. Connect a digital voltmeter to pin 3 at one of the module masterboard connectors. The voltage should read +35.375 V ±0.015 V. If the voltage is not correct, partially remove the power supply without disconnecting the pigtail plug and adjust R211 through the hole in the power supply can. The other five d-c voltages are given below:

Pin 4	+12 Vdc	-	±0.6 V
Pin 7	-12 Vdc	-	±0.6 V
Pin 9	+18 Vdc	-	±0.9 V
Pin 10	-18 Vdc	-	±0.9 V
Pin 8	-35 Vdc	-	±1.7 V

3-11. If no voltage output is present at any of the d-c supplies, inspect transistor Q304 in the switching circuit since a very heavy current flows through this component. An open or a short at either Q303 or Q304 would mean no a-c current at the autotransformer primary and hence no output. If Q304 shorts out, Q305 would also probably be affected as the series transistor Q305 would see a very low resistance through to ground. A d-c voltage check at the emitter of series transistor Q305 should be +28 volts ±1 V and the collector voltage should read +22 volts +1 V.

3-12. Excessive ripple may sometimes be caused by a breakdown of one of the diodes in the output rectifier producing halfwave instead of fullwave rectification. Diodes CR101 through CR107 are located beneath the L-shaped board and are not called out in Figures 3-1 and 3-2.

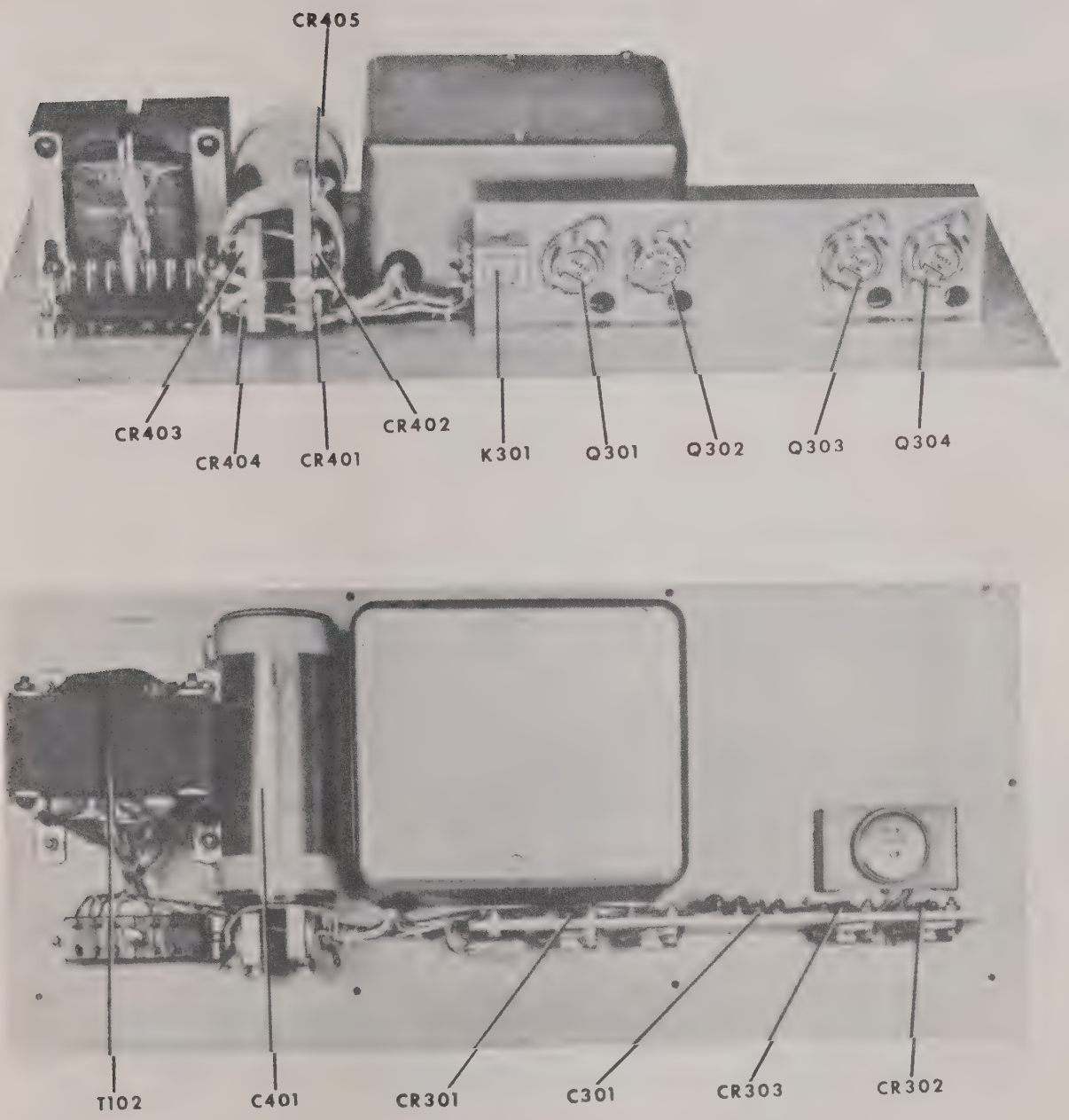


Figure 3-1. Front and Top View, Power Supply

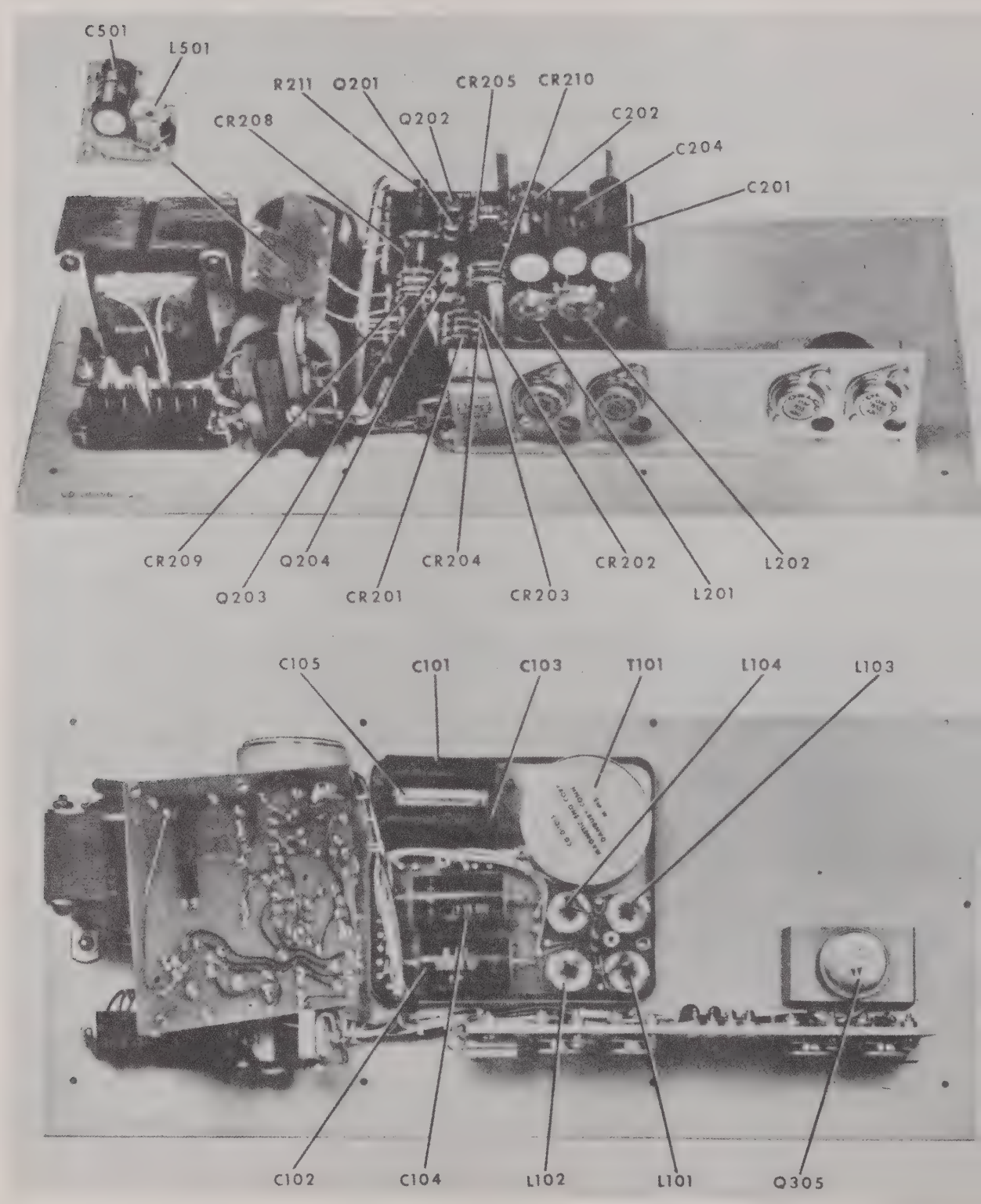


Figure 3-2. Top Views with Can and Printed Circuit Board removed

3-13. After isolating a malfunction to a specific section, check the transistors in the circuit as follows:

a. Obtain a voltmeter (Simpson 260) and adjust the meter for a continuity check. Set resistance at R X 100.

b. Locate the emitter, base and collector terminals of each transistor.

c. Place the test probes between emitter and base: then reverse the position of the probes (or reverse the polarity switch on the meter). One of these positions should indicate forward bias on the meter.

d. Continue checking between base-collector, base-emitter and emitter collector.

e. If the voltmeter does not deflect in either position, the junction is probably open. Replace component.

f. If both positions cause the meter to indicate the same resistance, the junction is probably shorted. Replace component.

g. Before replacing a transistor, examine associated components with the meter to determine if any change in value may have caused damage to the transistor.

3-14. MODEL 306-T. When troubleshooting or replacing components, refer to schematic drawing 9043 and Figures 3-3 and 3-4 which call out the primary components used in the equipment. A replacement parts list is shown in Table 3-3.

3-15. INITIAL ADJUSTMENT. Connect a digital voltmeter to Pin 3 at one of the module masterboard connectors. The voltage should read +35.399 V ±0.176 V. If this voltage is off by a nominal amount, adjust R46. Check Pin 9, this voltage should read +18.000 V ±0.360 V (this voltage is also adjusted by R46).

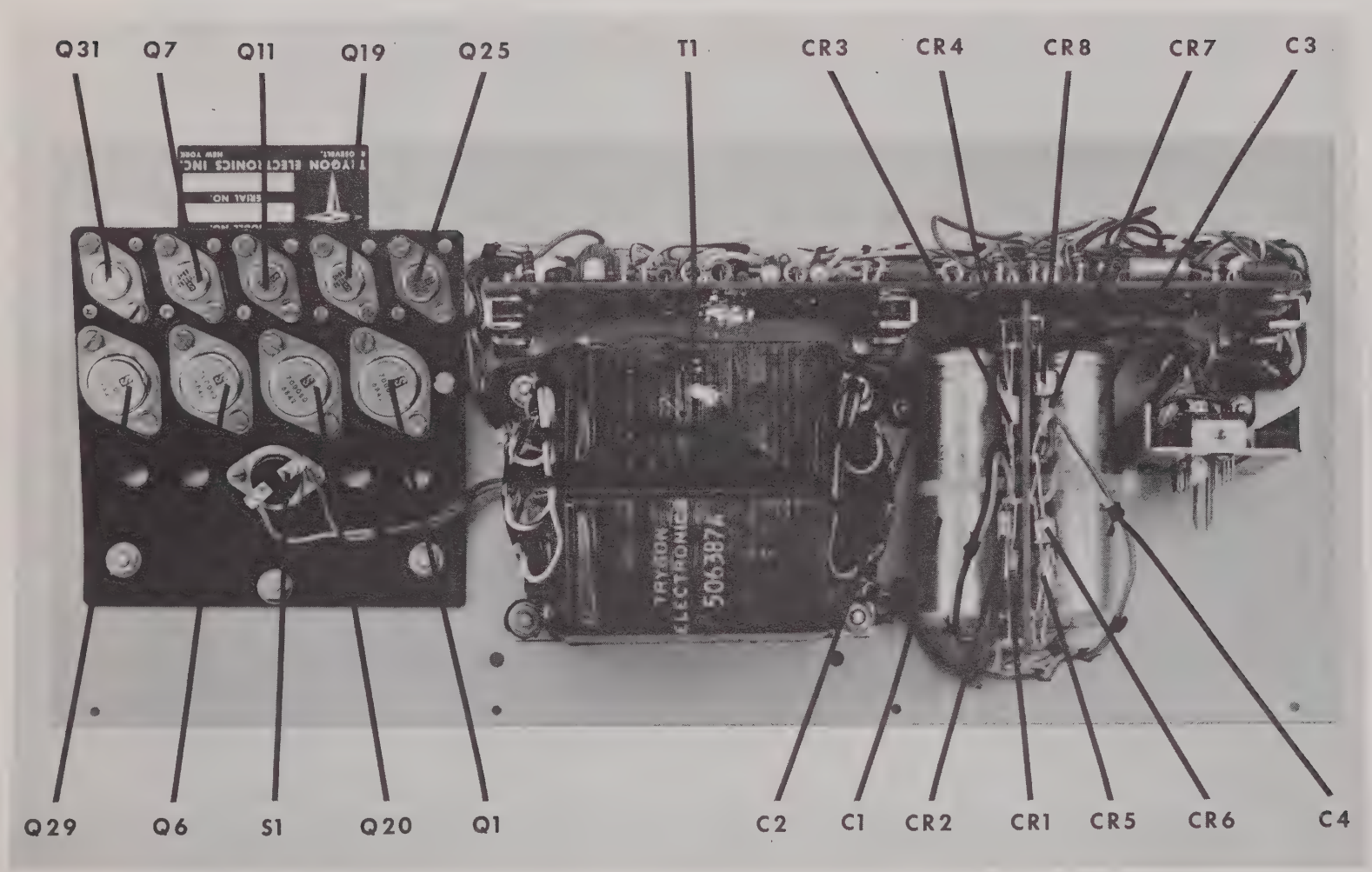


Figure 3-3. Top View, 306-T Power Supply

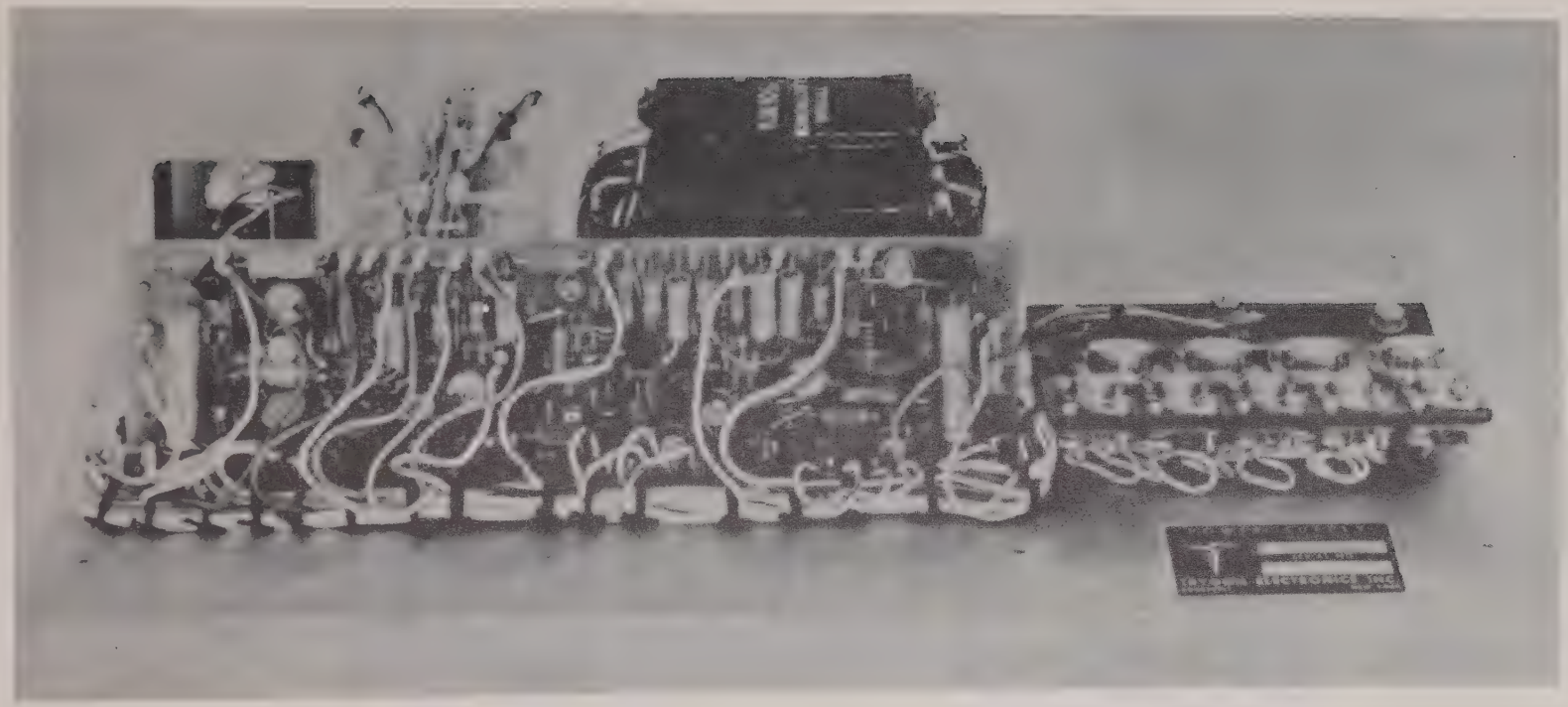


Figure 3-4. Side View, 306-T Power Supply

3-16. R32 will adjust the -18 V and -35 V as follows:

Pin 10	-18.000 V	±0.360 V
Pin 8	-35.000 V	±0.350 V

3-17. R59 will adjust the ±12 V as follows:

Pin 4	+12.000 V	±0.240 V
Pin 7	-12.000 V	±0.240 V

3-18. TROUBLESHOOTING. If no output is present at any of the supplies, check all fuses, primary power lines, external circuitry and power switch before attempting to troubleshoot the supply.

NOTE

The supply is equipped with an internal thermal switch which will turn the supply off when the temperature of the transistor heatsink reaches 100°C.

3-19. If any of the supplies are shorted, the interlock feature will cause all supplies to collapse to approximately the following voltages:

±35 Vdc will read approximately 17 Vdc

±18 Vdc will read approximately 3.6 Vdc

±12 Vdc will read approximately 2.4 Vdc

3-20. To isolate the defective supply take the external power supply and apply +35 Vdc to the +35 Vdc output of the 306-T supply and check the other output voltages of 306-T with the digital voltmeter. If the other voltages come up to their proper level, the +35 Vdc section of the 306-T is effective.

3-21. If the other output voltages of the 306-T do not come up to the proper level, apply the external voltage to a different voltage output of the 306-T observing polarity and level. When the defective 306-T section is reached, the other voltages in the supply will go to their normal level.

3-22. When the defective 306-T section is isolated, the interlock transistor associated with that section (see schematic diagram 9043) should be checked first.

3-23. If voltage checks show no noticeable deviations from the prescribed values, disconnect AC power and proceed with point-to-point resistance checks across pots, diodes, resistors, transistors, in that order.

NOTE

Transistors should be checked with a transistor tester or with a VOM. Proper polarity must be observed when checking PNP and NPN transistors to avoid erroneous measurements. The forward resistance of a transistor is low, but never zero while the backward resistance is always higher than the forward resistance. For good transistors, the forward resistance for any junction is always greater than zero.

MODEL GMA Power Supply

Table 3-2. Replacement Parts List

Item No.	Ref. Des.	Part Description	Manufacturer's Part Number	Manufacturer's Name	Qty/ Assy.	Qty/ Unit	spares Recm*	Remarks
1		Power Supply Assembly	TA-010520	DCS	1			
2		Capacitor	5C13, 25V	Sprague	6	.5		Used in Item #1
			1 mf					
3		Fan, Muffin	Venturi Type	Rotron	1	1		" "
4	J15	Connector	DPX-25C-3	Cannon	1			" "
			34P-1A					
5	J201	Connector	UG-657/U	Dage	28			" "
6	SW1	Switch	2GK63-72	Carling	1	1	1	" "
7	F1	Fuse	3AG, 250V	Little Fuse	1		5	" "
			1.5A					
8		Lower Board Assembly	TA-010541	DCS	1			
9	R101	Resistor MS35043	EB, 1/2W	Allen Brad.	4	.2		Used in Item #8
			220ohms 10%					
10	R102	Resistor MS35043	EB, 1/2W	Allen Brad.		.2		" "
			220ohms 10%					
11	R103	Resistor MS35043	EB, 1/2W	Allen Brad.		.2		" "
			220ohms 10%					
12	R104	Resistor MS35043	EB, 1/2W	Allen Brad.		.2		" "
			220ohms 10%					
13	R105	Resistor MS35043	EB, 1/2W	Allen Brad.	4	.2		" "
			22K, 10%					
14	R106	Resistor MS35043	EB, 1/2W	Allen Brad.		.2		" "
			22K, 10%					
15	R107	Resistor MS35043	EB, 1/2W	Allen Brad.		.2		" "
			22K, 10%					

*Spares for 1 unit per 10,000 hrs. con't. operation.

Table 3-2. Replacement Parts List (continued)

MODEL GMA Power Supply

Item No.	Ref. Des.	Part Description	Manufacturer's Part Number	Manufacturer's Name	Qty/ Assy.	Qty/ Unit	spares Recm*	Remarks
16	R108	Resistor MS35043	EB, 1/2W	Allen Brad.		.2		Part of Item #8
			22K, 10%					
17	CR101	Diode	CER69	Solitron	8	1	5	" "
18	CR102	Diode	CER69	Solitron		1		" "
19	CR103	Diode	CER69	Solitron		1		" "
20	CR104	Diode	CER69	Solitron		1		" "
21	CR105	Diode	CER69	Solitron		1		" "
22	CR106	Diode	CER69	Solitron		1		" "
23	CR107	Diode	CER69	Solitron		1		" "
24	CR108	Diode	CER69	Solitron		1		" "
25	C101	Capacitor	601D, 20V	Sprague	1	.5	1	" "
			900mf					
26	C102	Capacitor	601D, 50V	Sprague	1	.5	1	" "
			350mf					
27	C103	Capacitor	601D, 20V	Sprague	1	.5		" "
			900mf					
28	C104	Capacitor	601D, 50V	Sprague	1	.5		" "
			350mf					
28A	C105	Capacitor	50V, 50mf	Sprague				" "
			TE1307					
29	L101	Coil BA-014475	150 mh	DCS	1	.5		" "
30	L102	Coil BA-014477	75 mh	DCS	1	.5		" "
31	L103	Coil BA-014475	150 mh	DCS	1	.5		" "

*Spares for 1 unit per 10,000 hrs. con't. operation.

Table 3-2. Replacement Parts List (continued)

MODEL GMA Power Supply

Item No.	Ref. Des.	Part Description	Manufacturer's Part Number	Manufacturer's Name	Qty/ Assy.	Qty/ Unit	spares Recm*	Remarks
32	L104	Coil BA-014477	75 mh	DCS	1	.5		Part of Item #8
33		Upper Board Assembly		DCS	1			
34	C201	Capacitor	601D, 30V	Sprague	2	.5		Used in Item #33
			880mf					
35	C202	Capacitor	601D, 30V	Sprague		.5		" "
			880mf					
36	Q201	Transistor	2N2218	Motorola	1	1		" "
37	Q202	Transistor	2N1131	Fairchild	1	1		" "
38	R201	Resistor MS35043	EB, 1/2W	Allen Brad.	2	.2		" "
			220ohms, 10%					
39	R202	Resistor MS35043	EB, 1/2W	Allen Brad.		.2		" "
			220ohms, 10%					
40	R203	Resistor MS35043	EB, 1/2W	Allen Brad.	3	.2		" "
			10K, 10%					
41	R204	Resistor MS35043	EB, 1/2W	Allen Brad.		.2		" "
			10K, 10%					
42	R208	Resistor MS35043	EB, 1/2W	Allen Brad.		.2		" "
			10K, 10%					
43	R205	Resistor MS35043	MF5C-D, 1%	Electra	1	.2		" "
			1/4 W, 619ohms					
44	R206	Resistor MS35043	EB, 1/2W	Allen Brad.	1	.2		" "
			1K, 10%					
45	R207	Resistor MS35043	EB, 1/2W	Allen Brad.	1	.2		" "
			F. A. 10%					

*Spares for 1 unit per 10,000 hrs. con't. operation.

Table 3-2. Replacement Parts List (continued)

MODEL GMA Power Supply

Item No.	Ref. Des.	Part Description	Manufacturer's Part Number	Manufacturer's Name	Qty/ Assy.	Qty/ Unit	spares Recm*	Remarks
46	R209	Resistor MS35350	CG, 1/4W	Texas Instr.	1	.2		Used in Item #33
			1%, 14.7K					
47	R210	Resistor MS35350	CG, 1/4W	Texas Instr.	1	.2		" "
			1%, 2.87K					
48	R211	Potentiometer 3067	3067P-1-501	Bourns	1	1		" "
			500 ohms					
49	R212	Resistor MS35043	EB, 1W	Allen Brad.	1	.2		" "
			10%, 1K					
50	CR201	Diode	CER69	Solitron	5	1		" "
51	CR202	Diode	CER69	Solitron		1		" "
52	CR203	Diode	CER69	Solitron		1		" "
53	CR204	Diode	CER69	Solitron		1		" "
54	CR205	Diode	CER69	Solitron		1		" "
55	CR206	Diode	IN823	Solitron	1	1	1	" "
56	CR207	Diode	IN765-2	Solitron	1	1	1	" "
57	C205	Capacitor	101D, BS25V	Gentronics	1	.5		" "
			10 mf					
58	L201	Coil	75 mh	DCS	2	.5		" "
59	L202	Coil	75 mh	DCS		.5		" "
60	R213	Resistor MS35350	CG, 1/4W	Texas Instr.	2	.5		" "
			1%, 14.7K					
61	R214	Resistor MS35350	CG, 1/4W	Texas Instr.		.5		" "
			1%, 14.7K					

*Spares for 1 unit per 10,000 hrs. con't. operation.

Table 3-2. Replacement Parts List (continued)

MODEL GMA Power Supply

Item No.	Ref. Des.	Part Description	Manufacturer's Part Number	Manufacturer's Name	Qty/ Assy.	Qty/ Unit	spares Recm*	Remarks
62	R215	Resistor MS35350	CG, 1/4W	Texas Instr.	1	.5		Used in Item #33
			1%, F.A.					
63	R216	Resistor MS35043	EB, 1/2W	Allen Brad.	1	.2		" "
			10K, 10%					
64	R217	Resistor MS35043	EB, 1/2W	Allen Brad.	1	.2		" "
			22K, 10%					
65	CR208	Diode	IN766-1	Transitron	1	1	1	" "
66	CR209	Diode	CER69	Solitron	2	1		" "
67	CR210	Diode	CER69	Solitron		1		" "
68	Q203	Transistor	2N2218	Motorola	1	1	1	" "
69	Q204	Transistor	2N1131	Fairchild	1	1	1	" "
70	C203	Capacitor BD-014132	25V, 30mf	Gentronics	1	.5		" "
71		Bridge Rectifier Ass'y.	BA-010522	DCS	1			
72	CR401	Rectifier	MR323	Motorola	2	1	1	Used in Item #71
73	CR402	Rectifier	MR323	Motorola		1		" "
74	CR403	Rectifier	MR323R	Motorola	3	1	1	" "
75	CR404	Rectifier	MR323R	Motorola		1		" "
76	CR405	Rectifier	MR323R	Motorola		1		" "
77	C401	Capacitor	4M/50, 50V	Sangamo	1	.5	1	" "
			4000mmf					
78		Heat Sink Assembly	CA-010519	DCS	1			
79	CR301	Diode	CER69	Solitron	3	1		Used in Item #78
80	CR302	Diode	CER69	Solitron		1		" "

*Spares for 1 unit per 10,000 hrs. con't. operation.

Table 3-2. Replacement Parts List (continued)

MODEL GMA Power Supply

Item No.	Ref. Des.	Part Description	Manufacturer's Part Number	Manufacturer's Name	Qty/ Assy.	Qty/ Unit	spares Recm*	Remarks
81	CR303	Diode	CER69	Solitron		1		Used in Item #78
82	R301	Resistor MS35045	HB, 2W	Allen Brad.	1	.3		" "
			68 ohms					
83	R302	Resistor	820ohms, 2W	Allen Brad.	1	.3		" "
84	R303	Resistor	15ohms, 1W					" "
84A	R304	Resistor	EB, 68ohms	Allen Brad.				" "
			1/2W, 10%					
85	C301	Capacitor	20V, 1mfd	Sprague	1	.5		" "
85A	C302	Capacitor	100V, 1mfd	RMC	1	.5		" "
86	Q301	Transistor	2N553	Delco	4	1	2	" "
87	Q303	Transistor	2N3792	Delco		1		" "
88	Q304	Transistor	2N3792	Delco		1		" "
89	Q302	Transistor	2N553	Delco		1		" "
90	K301	Relay	3S2791G-	G.E.	1	1		" "
			200F9					
91	T101	Transformer, Toroid	CD-011015	DCS	1			
92	T102	Transformer, Power	CD-009278	DCS	1		1	
93	Q305	Transistor	2N2082	Motorola	1	1	1	
94	C105	Capacitor	50mfd. 50V	Sprague	1	.5		
95	C204	Capacitor	450mfd, 50V	Sprague	1	.5		
95A	C203	Capacitor	30uf, 25V	Illinois				
			SMT-5005					
96		Filter Board Ass'y.	BA-012394	DCS	1			

*Spares for 1 unit per 10,000 hrs. con't. operation.

Table 3-2. Replacement Parts List (continued)

MODEL GMA Power Supply

Item No.	Ref. Des.	Part Description	Manufacturer's Part Number	Manufacturer's Name	Qty/ Assy.	Qty/ Unit	spares Recm*	Remarks
97	C501	Capacitor	SMT, 50V	Illinois	1	.5		Used in Item #96
			150uf					
98	L501	Coil	365651K.1A40	Siemenscore				
			150turns, 28wire , 1MH					Available at DCS only
99		Filter Board Ass'y.	BA-012920	DCS	1			
100	L601	RFI Choke BA-012964			2			Used in Item #99
101	L602	RFI Choke BA-012964						" "
102	C601	Capacitor	400V, +80 -20%	CRL	2	.5		" "
			.05uf					
103	C602	Capacitor	400V, +80 -20%	CRL		.5		" "
			05uf					
104	C603	Capacitor	400V, 20%	Goodall	1	.5		" "
			.22uf					

*Spares for 1 unit per 10,000 hrs. con't. operation.

Table 3-3. Replacement Parts List

MODEL DCX-6B

Item No.	Ref. Des.	Part Description	Manufacturer's Part Number	Manufacturer's Name	Qty/ Assy.	Qty/ Unit	spares Recm*	Remarks
1	C1, 2	Capacitor, 1200 MFD, 75V	128G07SJS4	Sprague			2	
2	C3, 4	Capacitor, 2600 MFD, 40V	39D268G040 JS4	Sprague			2	
3	C5, 6	Capacitor, 75 MFD, 50V	NLW75-50	Cornell Dub.			2	
4	C7-10, 13, 14	Capacitor, .01 MFD, 600V	811Z5V103P	Erie			4	
5	C11, 12	Capacitor, 2.2 MFD, 6V	TS1K-6-225	Components Inc.			2	
6	C15, 20	Capacitor, 22 MFD, 35V, Solid Tantalum, Sleeved		Delburn			2	
7	C16, 19	Capacitor, 47 MFD, 20V, Solid Tantalum, Sleeved		Delburn			2	
8	C17, 18	Capacitor, 68 MFD, 15V, Solid Tantalum, Sleeved		Delburn			2	
9	CR1-4	Diode	E0130	Gen. Instr.			2	
10	CR5-8	Diode	MR1031B	Motorola			2	
11	CR9, 10, 11, 12	Diode, Zener	1N4384	Gen. Instr.			2	
12	CR13, 14	Diode, Zener	1N751A	Transitron			1	
13	CR15, 17, 20-26, 29-33	Diode	TR4148	Trygon			7	
14	CR18, 27	Diode, Zener	1N968B	Motorola			2	
15	CR19, 28	Diode, Zener	1N964B	Motorola			2	
16	CR1-6	Diode, Zener	1N2163A	Semcor			1	

*Spares for 1 unit per 10,000 hrs. con't. operation.

Table 3-3. Replacement Parts List (continued)

MODEL DCX-6B

Item No.	Ref. Des.	Part Description	Manufacturer's Part Number	Manufacturer's Name	Qty/ Assy.	Qty/ Unit	spares Recm*	Remarks
17	CR34-	Diode	E016	Gen. Instr.			3	
	39							
18	J1	Connector	01-2114-111-	Elco			1	
			104-000					
19	Q1, 6,	Transistor	700080	Trygon			4	
	20, 29							
20	Q2, 3,	Transistor	2N3566	Fairchild			5	
	4, 8, 9, 12-16							
21	Q5	Transistor	TR1000	Trygon			1	
22	Q7, 11,	Transistor	700191	Trygon			4	
	19, 25,							
	31							
23	Q10	Transistor	TR497	Trygon			1	
24	Q17, 21,	Transistor	2N3638A	Fairchild			3	
	23, 26,							
	27, 30							
25	Q18, 22,	Transistor	TR2905	Trygon			2	
	28							
26	Q24	Transistor	TR1132	Trygon			1	
27	R1, 22	Resistor, 1KΩ, 2W, 10%	BWH	Int. Resistor Corp.			2	
28	R2, 4,	Resistor, 2.2KΩ, .5W, 10%	RC20GF222K	Allen Brad.			2	
	19							
29	R3	Resistor, 120Ω, .5W, 10%	RC20GF121K	Allen Brad.			1	
30	R5	Resistor, 1Ω, 3W, 3%	1300S1-3	Sage			1	

*Spares for 1 unit per 10,000 hrs. con't. operation.

Table 3-3. Replacement Parts List (continued)

MODEL DCX-6B

Item No.	Ref. Des.	Part Description	Manufacturer's Part Number	Manufacturer's Name	Qty/ Assy.	Qty/ Unit	spares Recm*	Remarks
31	R6, 7,	Resistor, 4.7KΩ, .5W, 10%	RC20GF472K	Allen Brad.			2	
	11, 51							
32	R8, 13,	Resistor, 10KΩ, .5W, 10%	RC20GF103K	Allen Brad.			4	
	48, 56							
33	R9, 16	Resistor, .3Ω, 3W, 3%	1300S3-3	Sage			2	
34	R10, 12,	Resistor, 470Ω, .5W, 10%	RC20GF471K	Allen Brad.			5	
	17, 28,							
	29, 37,							
	38, 50,							
	54, 57, 18							
35	R14	Resistor, 680Ω, .5W, 10%	RC20GF681K	Allen Brad.			1	
36	R15, 20	Resistor, 220Ω, .5W, 10%	RC20GF221K	Allen Brad.			1	
37	R20	Resistor, .7Ω, 3W, 3%	1300S7-3	Sage			1	
38	R23	Resistor, 301Ω, .5W, 1%	Type CECTO	Int. Resistor Corp.			1	
39	R24, 25	Resistor, 1KΩ, .5W, 10%	RC20GF102K	Allen Brad.			3	
	30, 35,							
	36, 41, 60							
40	R26, 33	Resistor, 1KΩ, .5W, 1%	CECTO	Int. Resistor Corp.			2	
41	R27, 61	Resistor, 1.92KΩ, .5W, .5%	CECTO	Int. Resistor Corp.			2	
42	R31, 62	Resistor, 1.95KΩ, .5W, .5%	CECTO	Int. Resistor Corp.			2	
43	R32	Potentiometer, 100Ω	Type 100	Chicago Tel. Supply			1	
44	R34	Resistor, 200Ω, .5W, 1%	CECTO	Int. Resistor Corp.			1	
45	R39, 40	Resistor, 3.95KΩ, .5W, .5%	CECTO	Int. Resistor Corp.			1	

*Spares for 1 unit per 10,000 hrs. con't. operation.

Table 3-3. Replacement Parts List (continued)

MODEL DCX-6B

Item No.	Ref. Des.	Part Description	Manufacturer's Part Number	Manufacturer's Name	Qty/ Assy.	Qty/ Unit	spares Recm*	Remarks
46	R42, 43	Resistor, 15KΩ, .5W, 1%	CECTO	Int. Resistor Corp.			1	
47	R44	Resistor, 4.99KΩ, .5W, 1%	CECTO	Int. Resistor Corp.			1	
48	R45	Resistor, 5KΩ, 1W, 3%	1000S5000-3	Sage			1	
49	R46, 59	Potentiometer, 1KΩ, .5W	Type 100	Chicago Tel. Supply			2	
50	R47	Resistor, 1.5KΩ, 1W, 3%	1000S1500-3	Sage			1	
51	R52, 55	Resistor, 270Ω, 2W, 10%	BWH	Int. Resistor Corp.			1	
52	S1	Switch, Thermal	C6389-2	Trygon			1	
53	T1	Transformer	506387	Trygon			1	

*Spares for 1 unit per 10,000 hrs. con't. operation.

SECTION IV

DRAWINGS

4-1. GENERAL.

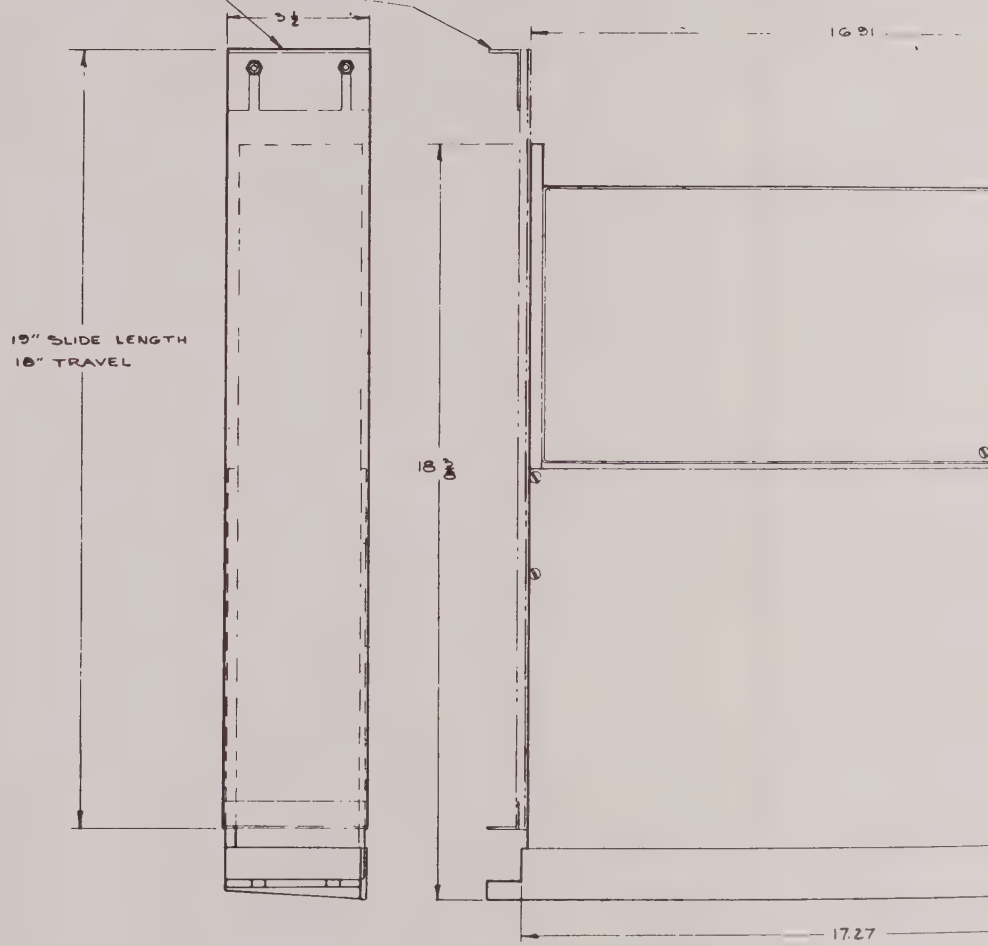
4-2. The drawings listed in this section are furnished to supplement the information given in the text.

DO-008954	Outline Drawing (GMA-1)
DO-011058	Outline Drawing (GMA-3)
DO-018875	Outline Drawing (GMA-6)
DO-018847	Outline Drawing (GMA-5)
DW-010873 (V)	Schematic Drawing
CA-010519 (F)	Heat Sink Assembly
E-9043	Schematic Drawing, 306-T

NO.	DATE	DESCRIPTION	BY	CHK	APP'D
01	9/4	CHANGED COMM. CODING FROM 30-1 MAKE 2-1 ETC.	GV	MJ	MJ
02	9/5	PER ECR-1893 ADDED "M" PREFIX TO ITEM CODE NOS. 112-8 WITH COMM. CODE	PHC	MJ	MJ
03	9/20	CHANGE ADD'L MATERIAL TO MAKE PLUG SMALL ENOUGH TO FIT	PH	MJ	MJ
04	9/20	CHG'E PER CA 597	PT	MJ	MJ
05	11/4	CA 615. APPROVAL WAS DETACH	MJ	RT	MJ
06	11/11	PER ECR-1911 CHGED LETTERS IN PART NUMBER	MJ	RT	MJ
07	11/16	CA 1922 - CHG'D NOTE 2	MJ	RT	MJ
08	11/16	CA-1939-4 - ADDED NOTE PER C.A.	MJ	RT	MJ
09	12/16	CA-1931-1 - CHG'D NOTE 2	MJ	RT	MJ

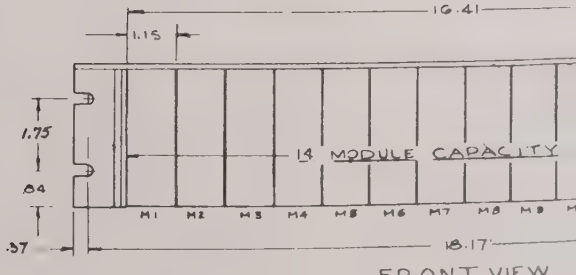
GRANT SLIDE, CAT.# 3460 (OPTIONAL NOT SUPPLIED WITH UNIT)

·NOTE·
THIS SLIDE IS SUPPLIED AS STANDARD OPTIONAL EQUIPMENT, ANY OTHER MAKE OR MODEL WILL BE CONSIDERED AS SPECIAL



LEFT SIDE
·WITH OPTIONAL SLIDE·

TOP VIEW



FRONT VIEW

DO-008954 K

POWER SUPPLY HOUSING, REMOVABLE FROM REAR. POWER SUPPLY MOUNTED TO COVER.

#8-32 NC-2B - TYP. EACH SIDE 3 HOLES (A)

17 7/8

11.00

5.00

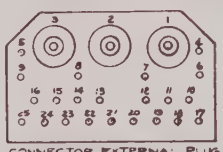
2 1/4

1 3/4

.82° CSK. HOLE FROM INSIDE RAIL FOR 8-32-.82° FHMS 6 'B' HOLES (TYP. EACH SIDE) THESE 'B' HOLES FOR RACK MOUNTING UNITS WITHOUT RACK SLIDES

RIGHT SIDE
- WITHOUT OPTIONAL SLIDE -

J-15 PIN CONNECTIONS



CONNECTOR EXTERNAL PLUG FURNISHED WITH EQUIPMENT

PIN	DESCRIPTION
1	N.C.
2	
3	N.C.
4	CHASSIS GROUND
5	N.C.
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	N.C.
18	118 V.A.C. LINE
19	118 V.A.C. LINE
20	N.C.
21	
22	
23	
24	N.C.

MASTER PLUG IN BOARD

PIN	DESCRIPTION
1.	TRIAX. SIG. LEAD (IN)
2.	TRIAX. SIG. LEAD (IN)
3.	+35VDC
4.	+12VDC
5.	GROUND
6.	SUMMING BUS
7.	-12VDC
8.	-35VDC
9.	+18V UNREG
10.	-18V UNREG.
11.	SEE MODULE OUTLINE DWG.
12.	
13.	
14.	
15.	
16.	
17.	
18.	
19.	COAX. SIG. LEAD (OUT)
20.	GROUND

NOTE: PINS ARE NUMBERED TOP TO BOTTOM

NO. 200 SERIES PLUG

A. N.C.
B. N.C.
D. SIGNAL
E. SIGNAL
H. SIGNAL GND.

	INPUT OR OUTPUT	OUTPUT OR INPUT
M-1	J301	J201
M-2	J302	J202
M-3	J303	J203
M-4	J304	J204
M-5	J305	J205
M-6	J306	J206
M-7	J307	J207
M-8	J308	J208
M-9	J309	J209
M-10	J310	J210
M-11	J311	J211
M-12	J312	J212
M-13	J313	J213
M-14	J314	J214

NOTE:

1) NO. 200 SERIES CONNECTORS ARE CINCH/JONES # 126-216. MATING CONNECTOR IS AMPHENOL #126-222. USE HI-TEMP #22 GAGE 7 STR. TEFLON WIRE FOR CONNECTIONS TO MATING CONNECTOR.

2) NO. 300 SERIES CONNECTORS ARE UG-69 B/U; MATING CONNECTORS ARE UG-69 B/U. USE RG-62 A/U COAXIAL CABLE FOR CONNECTIONS TO OUTPUT CONNECTORS FOR USE WITH BNC TERMINATED CABLES USE UG-260/U ADAPTOR

MASTER BOARD SEE TABULATION

POWER SWITCH

18 15/16

3.45

J-15

ON / OFF S1

F-1 1.5 AMPS

J314 J312 J310 J308 J306 J304 J302
J313 J311 J309 J307 J305 J303 J301
J214 J212 J210 J208 J206 J204 J202
J213 J211 J209 J207 J205 J203 J201

COOLING UNIT INLET

M10 M11 M12 M13 M14

1 3/16

REAR VIEW

CONNECTOR CANNON DDX-25C3-34P-1A
MATING CONNECTOR DPX-25C3-336-1A
SEE TAB FOR PIN CONN

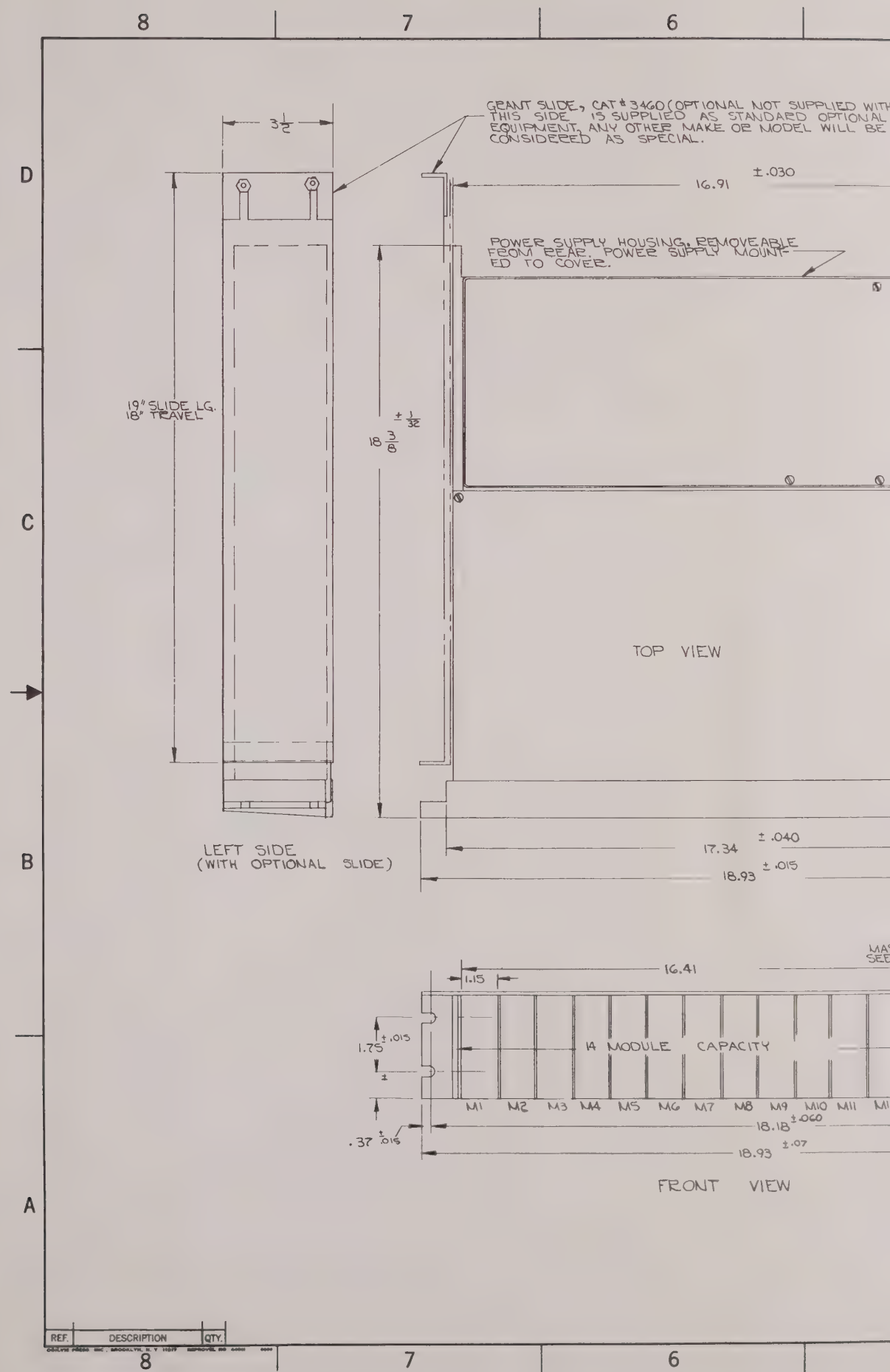
DATA CONTROL SYSTEMS, INC.

TITLE: OUTLINE DRAWING MODULE ASSEMBLY MODEL GMA-1

DO NOnot SCALE DRAWING

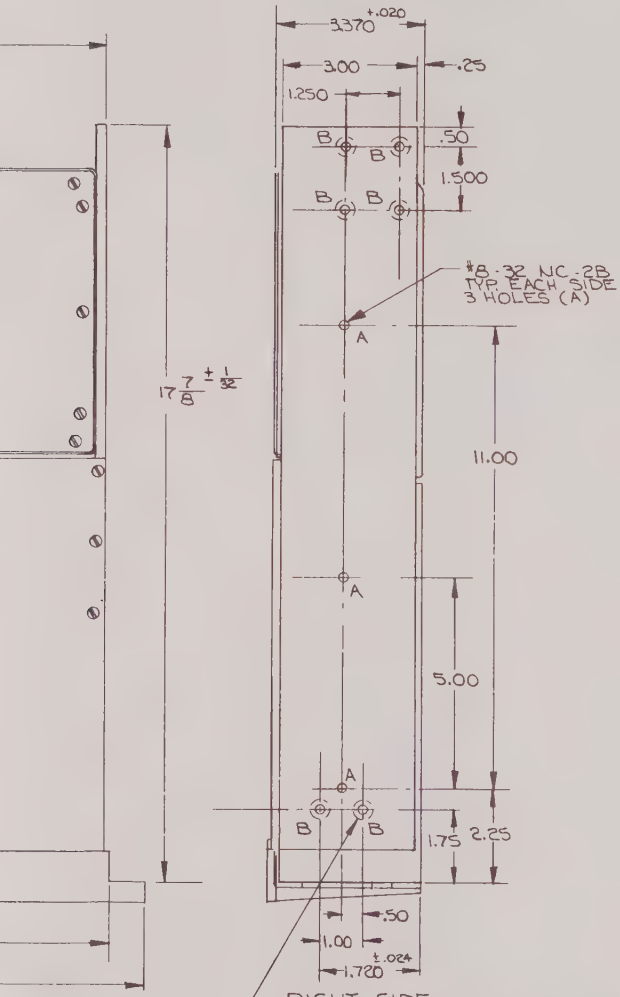
DO-008954 K

GMA-1 | 7

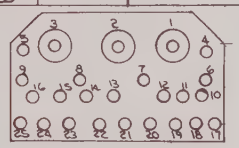

8
7
6
D
C
B
A
GRANT SLIDE, CAT # 3460 (OPTIONAL NOT SUPPLIED WITH THIS SIDE. IS SUPPLIED AS STANDARD OPTIONAL EQUIPMENT, ANY OTHER MAKE OR MODEL WILL BE CONSIDERED AS SPECIAL.
3 1/2
16.91 ±.030
POWER SUPPLY HOUSING, REMOVEABLE FROM REAR. POWER SUPPLY MOUNTED TO COVER.
19" SLIDE LG.
18" TRAVEL
18 3/8 ± 1/32
TOP VIEW
LEFT SIDE
(WITH OPTIONAL SLIDE)
17.34 ± .040
18.93 ± .015
16.41
1.15
1.75 ±.015
14 MODULE CAPACITY
M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M11
18.18 ±.060
.37 ±.015
18.93 ±.07
FRONT VIEW
REF.
DESCRIPTION
QTY.

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
~	D	I&E REDRAWN WITHOUT CHG.	5-1-68	

UNIT.



POWER CONN. (J15) CANNON NO. DPX-25C3-34P-1A. MATE *		MASTER PLUGIN BOARD	
PIN NO	DESCRIPTION	PIN NO	DESCRIPTION
1	N.C.	1	COAX SIG. LEAD
2		2	COAX SIG. LEAD
3		3	+35 VDC
4	CHASSIS GND.	4	+12 VDC
5	N.C.	5	GROUND
6		6	SUMMING BUSS
7		7	-12 VDC
8		8	-35 VDC
9		9	+18 V UNREG
10		10	-18 V UNREG
11		11	
12		12	
13		13	
14		14	
15		15	
16		16	
17		17	
18	115 VAC. LINE	18	
19	115 VAC. LINE	19	COAX SIG. LEAD
20	N.C.	20	GROUND.
21			
22			
23			
24			
25			



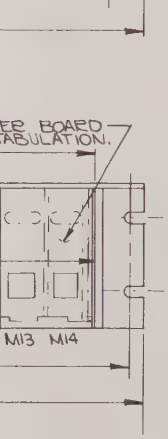
NOTES:
1) PINS ARE NUMBERED TOP TO BOTTOM.
2) * MATE (P15) NO. DPX-25C3-335-1A.

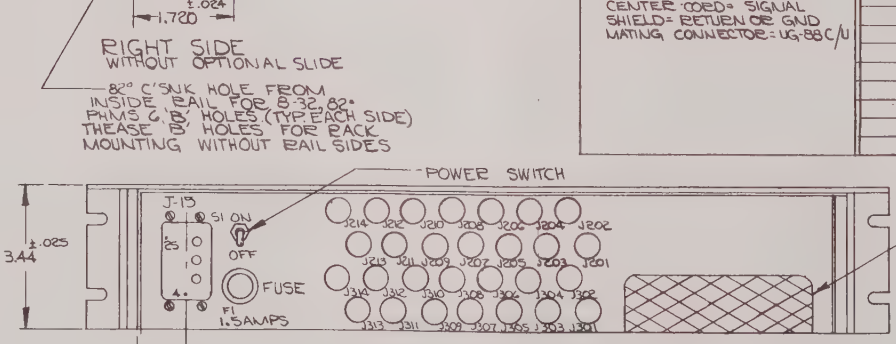
UG-657/U

J201 THRU J214
J301 THRU J314
CENTER CODED = SIGNAL
SHIELD = RETURN OR GND
MATING CONNECTOR = UG-88C/U

	INPUT OR OUTPUT	OUTPUT OR INPUT
MODULE 1 (M1)	J201	J301
2 (M2)	J202	J302
3 (M3)	J203	J303
4 (M4)	J204	J304
5 (M5)	J205	J305
6 (M6)	J206	J306
7 (M7)	J207	J307
8 (M8)	J208	J308
9 (M9)	J209	J309
10 (M10)	J210	J310
11 (M11)	J211	J311
12 (M12)	J212	J312
13 (M13)	J213	J313
14 (M14)	J214	J314

ER BOARD
TABULATION.





REAR VIEW

QTY REQD	PART OR IDENTIFYING NO.	CODE IDENT.	DESCRIPTION	SPECIFICATION OR VENDOR	SYMBOL	ITEM

LIST OF MATERIALS

DIMENSIONS AND TOLERANCES PER MIL STANDARD 8
UNLESS OTHERWISE SPECIFIED
TOLERANCES ON:
.XXX ± .005 .XX ± .010
FRACTIONS ± 1/64 ANGLES ± 0° 30'
FLATNESS WITHIN ~~
HOLE TOLERANCE PER D C S SPECIFICATION AS-814018, CLASS 1
BREAK ALL CORNERS AND EDGES, REMOVE BURRS .015 MAX

MATERIAL
FINISH

NEXT ASSY | USED ON
APPLICATION

CONTRACT NO.

		DATE
DRAWN	J. Parr	4-30-68
CHECKED	G. Roberts	4-30-68
DESIGNER		
PROJECT ENG		
APPROVED	[illegible]	5/2/68

APPROVED
APPROVED

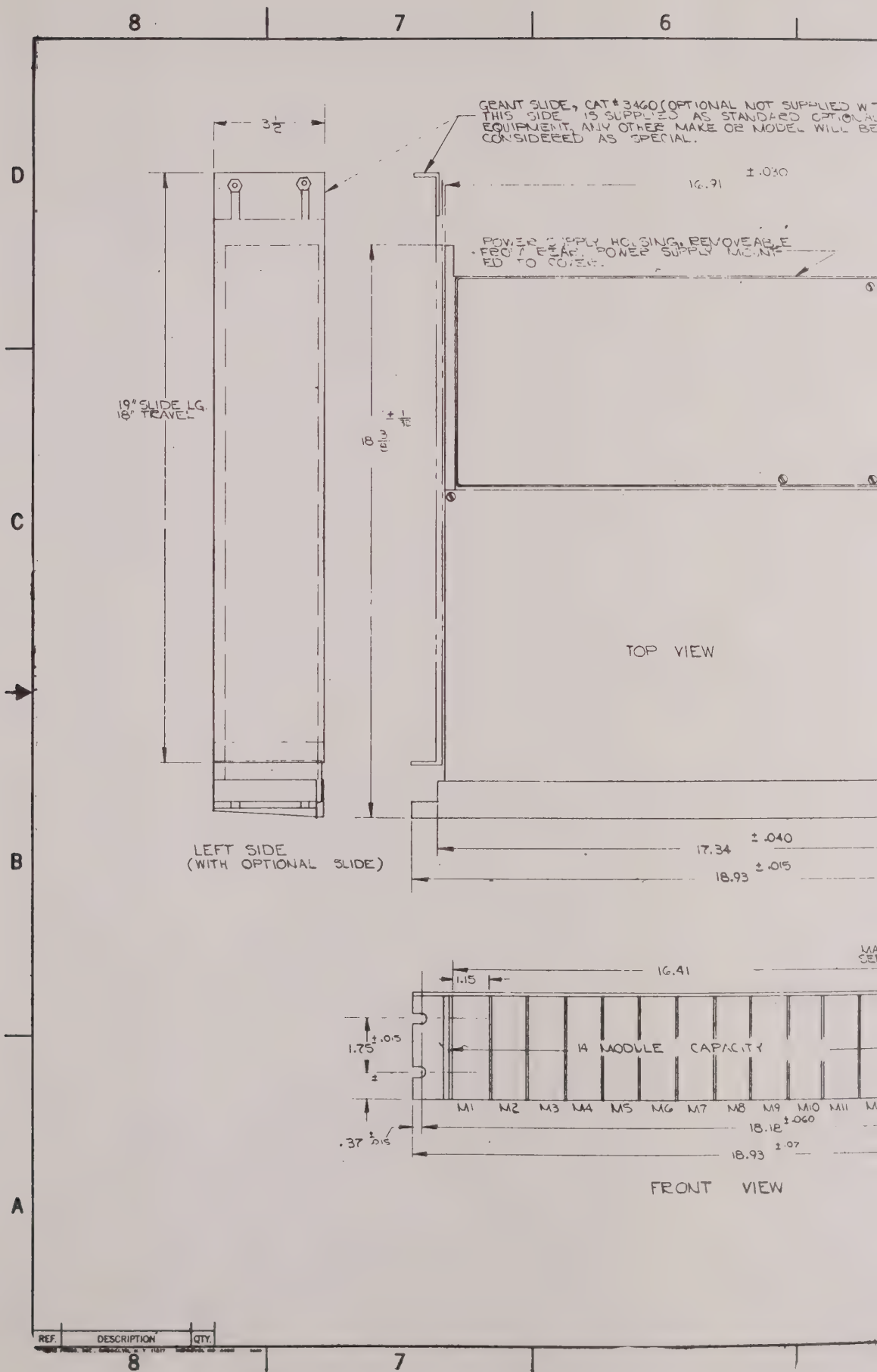
DATA-CONTROL SYSTEMS, INC.
DANBURY, CONN.

OUTLINE DRAWING
MODULE ASSY
MODEL GMA-3

SIZE	CODE IDENT.		REV.
D	08539	DO-011058	-- D

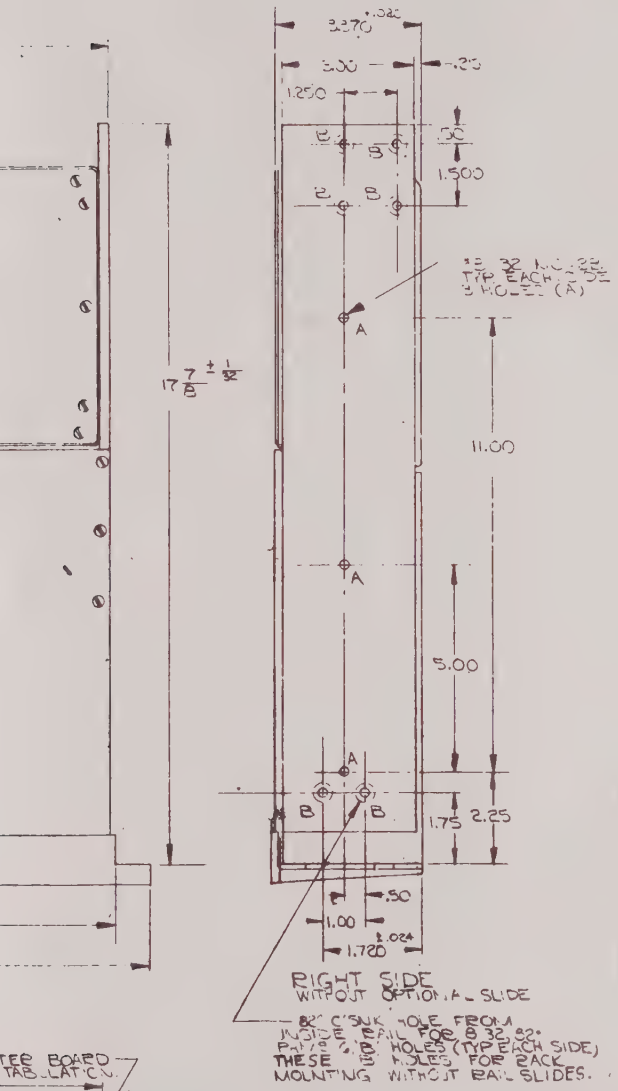
SCALE: SHEET

DO-011058-D


8
7
6
D
C
B
A
GRANT SLIDE, CAT # 3460 (OPTIONAL NOT SUPPLIED W
THIS SIDE. IS SUPPLIED AS STANDARD OPTIONAL
EQUIPMENT. ANY OTHER MAKE OR MODEL WILL BE
CONSIDERED AS SPECIAL.
3 1/2
16.91 ± .030
POWER SUPPLY HOUSING, REMOVEABLE
FROM REAR. POWER SUPPLY MOUNT-
ED TO COVER.
19" SLIDE LG.
18" TRAVEL
18 15/16 ± 1/32
TOP VIEW
LEFT SIDE
(WITH OPTIONAL SLIDE)
17.34 ± .040
18.93 ± .015
16.41
1.15
1.75 ± .015
14 MODULE CAPACITY
M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M11
18.18 ± .060
.37 ± .015
18.93 ± .07
FRONT VIEW
REF.
DESCRIPTION
QTY.

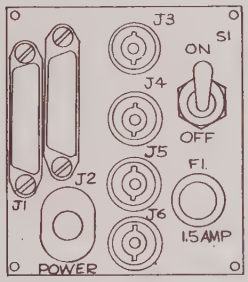
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED

UNIT.



AC POWER & AUTO-CAL.

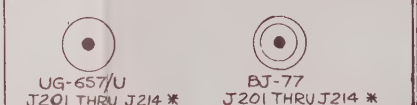
J1 } AMPHENOL *57-40240
J2 } MATING CONN *57-30240
J3 THRU J6, UG-657/U
MATING CONN., UG-88C/U



MASTER PLUGIN BOARD

PIN NO	DESCRIPTION
1	COAX SIG LEAD
2	COAX SIG. LEAD
3	+35 VDC
4	+12 VDC
5	GROUND
6	SUMMING BUS
7	-12 VDC
8	-35 VDC
9	+18 V UNREG
10	-18 V UNREG
11	
12	
13	
14	
15	
16	
17	
18	
19	COAX SIG. LEAD
20	GROUND.

NOTES:
1) PINS ARE NUMBERED TOP TO BOTTOM.



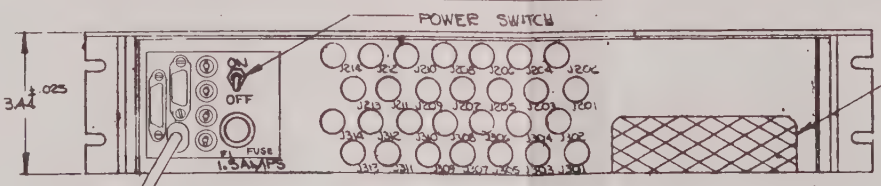
* UP TO 14 OF EACH TYPE CONN. MAY BE SUPPLIED AS REQUIRED.

MODULE	INPUT OR OUTPUT	OUTPUT OR INPUT
1 (M1)	J201	J301
2 (M2)	J202	J302
3 (M3)	J203	J303
4 (M4)	J204	J304
5 (M5)	J205	J305
6 (M6)	J206	J306
7 (M7)	J207	J307
8 (M8)	J208	J308
9 (M9)	J209	J309
10 (M10)	J210	J310
11 (M11)	J211	J311
12 (M12)	J212	J312
13 (M13)	J213	J313
14 (M14)	J214	J314

82° C'SNK HOLE FROM INSIDE RAIL FOR 8-32 SCR. PATTERN 'B' HOLES (TYP EACH SIDE) THESE 'B' HOLES FOR RACK MOUNTING WITHOUT RAIL SLIDES.

TEE BOARD TABULATION

M13 M14



SPIRAL POWER CORD

QTY REQD	PART OR IDENTIFYING NO.	CODE IDENT.	DESCRIPTION	SPECIFICATION OR VENDOR	SYMBOL	ITEM

LIST OF MATERIALS

NEXT ASSY	USED ON
APPLICATION	

DIMENSIONS AND TOLERANCES PER MIL STANDARD B
UNLESS OTHERWISE SPECIFIED
TOLERANCES ON:
XXX ± .005 XX ± .010
FRACTIONS ± 1/64 ANGLES ± 0° 30'
FLATNESS WITHIN
HOLE TOLERANCE PER D C S SPECIFICATION AS 81401B, CLASS 1
BREAK ALL CORNERS AND EDGES, REMOVE BURRS .015 MAX

MATERIAL

FINISH

CONTRACT NO.

DRAWN G. DYER DATE 8-19-69

CHECKED [signature] 8-19-69

DESIGNER

PROJECT ENG

APPROVED [signature] 8/19/69

APPROVED

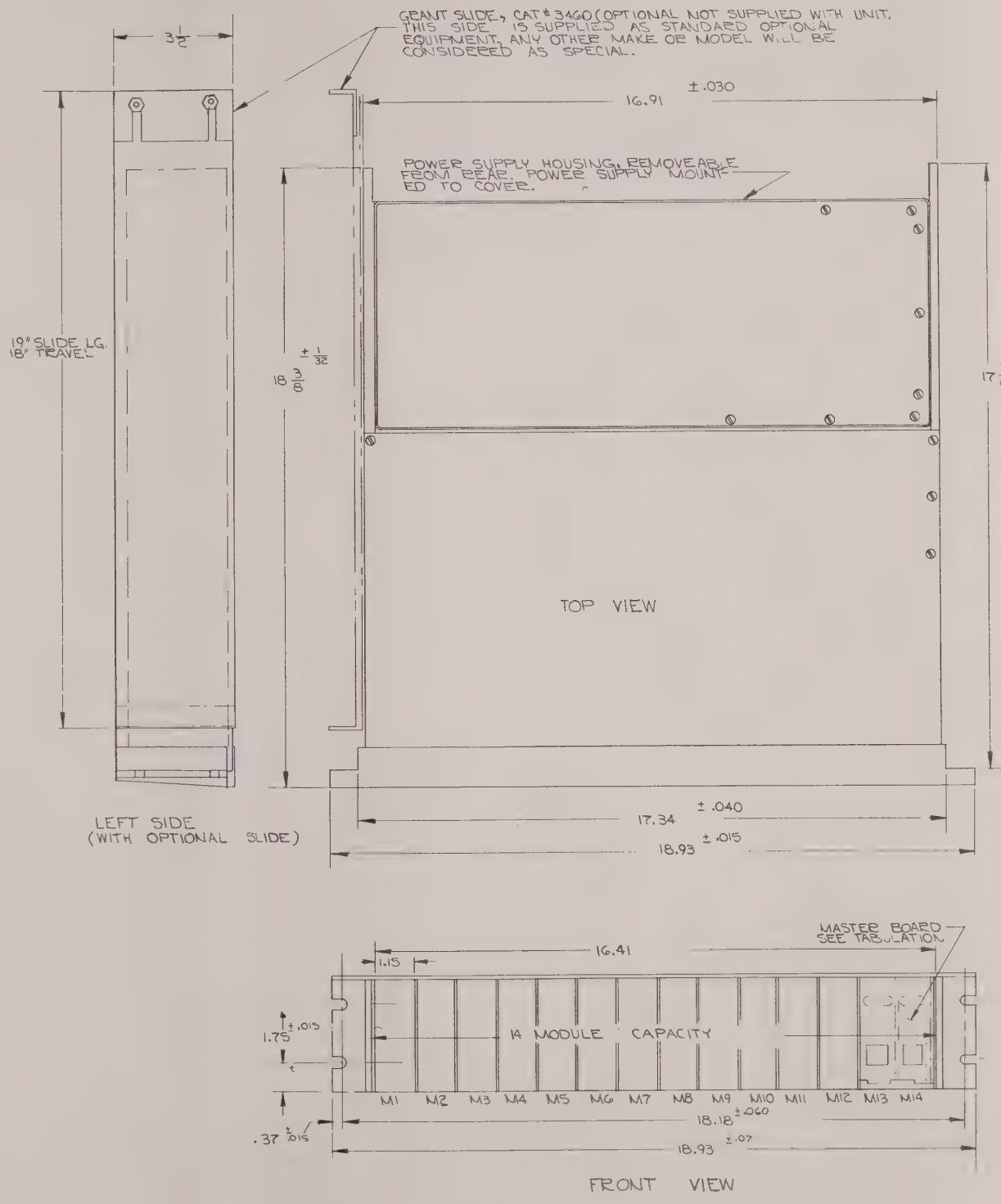
APPROVED

DATA-CONTROL SYSTEMS, INC.
DANBURY, CONN.

OUTLINE DRAWING
MODULE ASSY
MODEL GMA-6

SIZE	CODE IDENT.		REV.
D	08539	DO 018875	A

SCALE


GRANT SLIDE, CAT # 3460 (OPTIONAL NOT SUPPLIED WITH UNIT. THIS SIDE IS SUPPLIED AS STANDARD OPTIONAL EQUIPMENT, ANY OTHER MAKE OR MODEL WILL BE CONSIDERED AS SPECIAL.
3 1/2
19" SLIDE LG.
18" TRAVEL
18 3/8 ± 1/32
16.91 ± .030
POWER SUPPLY HOUSING, REMOVEABLE FROM REAR. POWER SUPPLY MOUNTED TO COVER.
17 7/8
TOP VIEW
LEFT SIDE
(WITH OPTIONAL SLIDE)
17.34 ± .040
18.93 ± .015
MASTER BOARD SEE TABULATION
16.41
1.15
1.75 ± .015
14 MODULE CAPACITY
M1 M2 M3 M4 M5 M6 M7 M8 M9 M10 M11 M12 M13 M14
18.18 ± .060
.37 ± .015
18.93 ± .07
FRONT VIEW

REF	DESCRIPTION	QTY.

ORLVIS PRESS INC., BROOKLYN, N.Y. 11217 REPRODUCTION NO. 6606

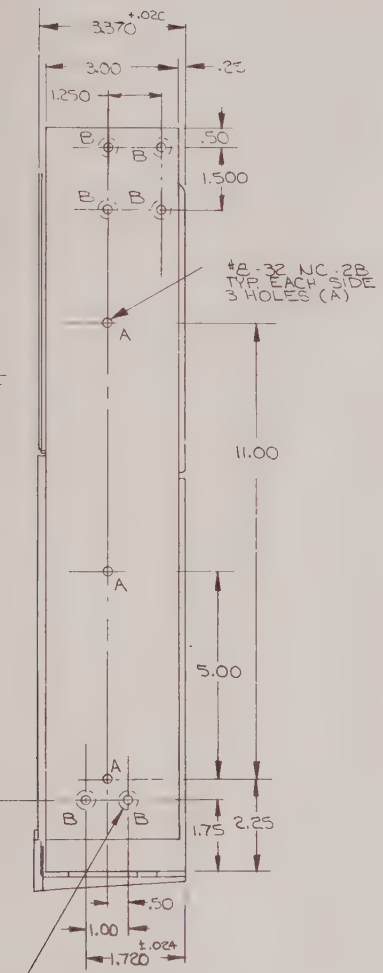
REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED

POWER CONN. (J15) HUBBEL NO # 6486 G - MATE *	
PIN NO	DESCRIPTION
1	115 VAC LINE
2	GND
3	115 VAC LINE

J15

MASTER PLUGIN BOARD	
PIN NO	DESCRIPTION
1	COAX SIG. LEAD
2	COAX SIG. LEAD
3	+35 VDC
4	+12 VDC
5	GROUND
6	SUMMING BUSS
7	-12 VDC
8	-35 VDC
9	+18 V UNREG
10	-18 V UNREG
11	
12	
13	
14	
15	
16	
17	
18	
19	COAX SIG. LEAD
20	GEOUND.

NOTES:
1) PINS ARE NUMBERED TOP TO BOTTOM
2) * MATE (P15) HUBBEL # 7484



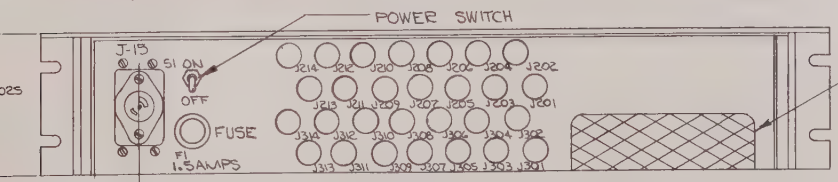
RIGHT SIDE
WITHOUT OPTIONAL SLIDE

82° C'SNK HOLE FROM INSIDE RAIL FOR 8-32, 82° PHMS 6 'B' HOLES (TYP EACH SIDE) THESE 'B' HOLES FOR BACK MOUNTING WITHOUT RAIL SLIDES.

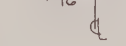
UG-657/U

J201 THRU J214
J301 THRU J314
CENTER CORE = SIGNAL
SHIELD = RETURN OR GND
MATING CONNECTOR = UG-88C/U

	INPUT OR OUTPUT	OUTPUT OR INPUT
MODULE 1 (M1)	J201	J301
2 (M2)	J202	J302
3 (M3)	J203	J303
4 (M4)	J204	J304
5 (M5)	J205	J305
6 (M6)	J206	J306
7 (M7)	J207	J307
8 (M8)	J208	J308
9 (M9)	J209	J309
10 (M10)	J210	J310
11 (M11)	J211	J311
12 (M12)	J212	J312
13 (M13)	J213	J313
14 (M14)	J214	J314



REAR VIEW



QTY REQD	PART OR IDENTIFYING NO.	CODE IDENT.	DESCRIPTION	SPECIFICATION OR VENDOR	SYMBOL	ITEM
LIST OF MATERIALS						

DIMENSIONS AND TOLERANCES PER MIL STANDARD 8
UNLESS OTHERWISE SPECIFIED TOLERANCES ON:
.XXX ±.005 .XX ±.010
FRACTIONS ± 1/64 ANGLES ± 0° 30'
FLATNESS WITHIN ~~
HOLE TOLERANCE PER D C S SPECIFICATION AS-814018, CLASS 1
BREAK ALL CORNERS AND EDGES. REMOVE BURRS .015 MAX

CONTRACT NO.

		DATE
DRAWN	G. DYER	5-2-69
CHECKED	G. Roberts	6-3-69
DESIGNER		
PROJECT ENG		
APPROVED	[illegible]	6/3/69

MATERIAL
APPROVED
FINISH
APPROVED

NEXT ASSY | USED ON
APPLICATION

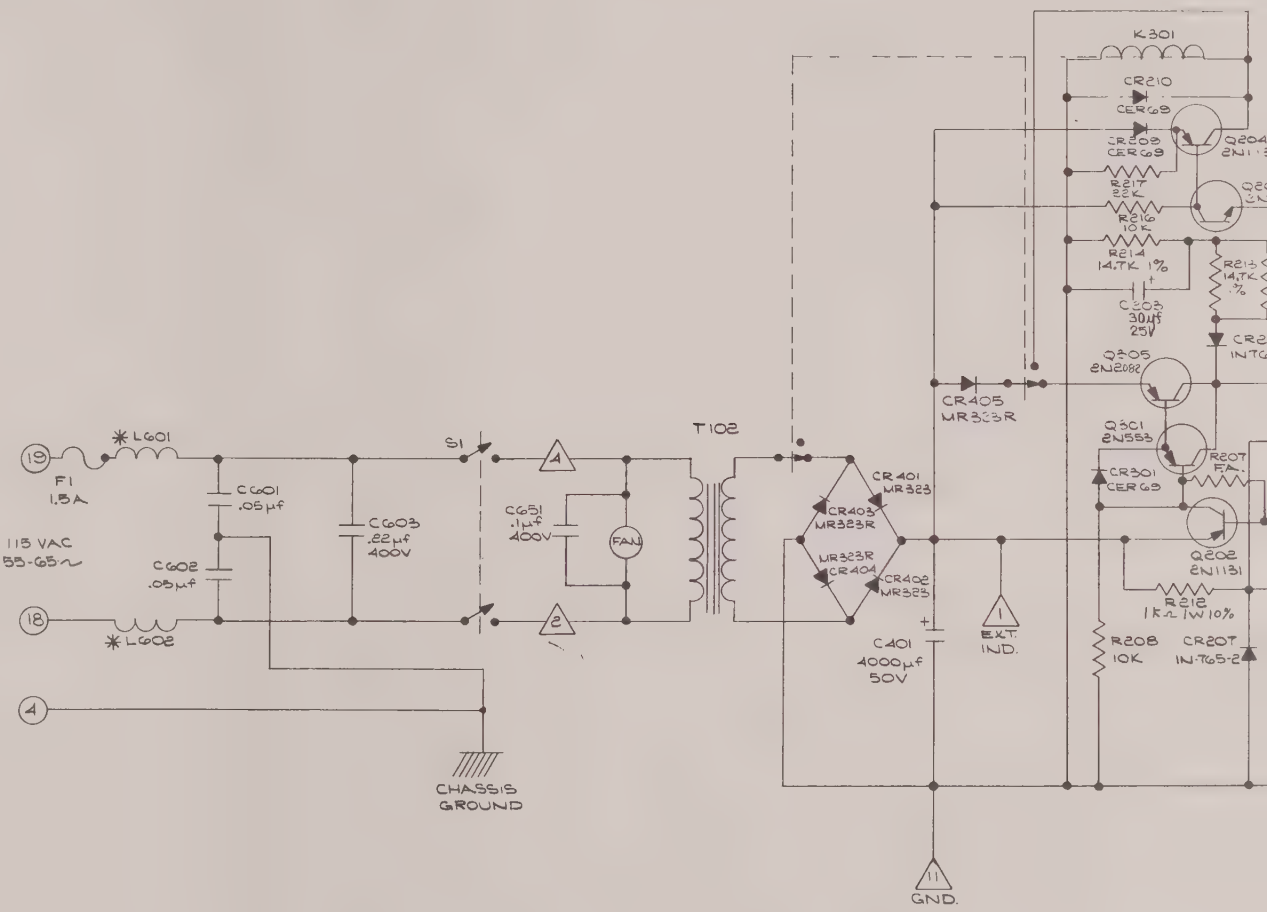
DATA-CONTROL SYSTEMS, INC.
DANBURY, CONN.

OUTLINE DRAWING
MODULE ASSY
MODEL GMA-5

SIZE	CODE IDENT.			REV.
D	08539	DO	018847	A

SCALE: SHEET

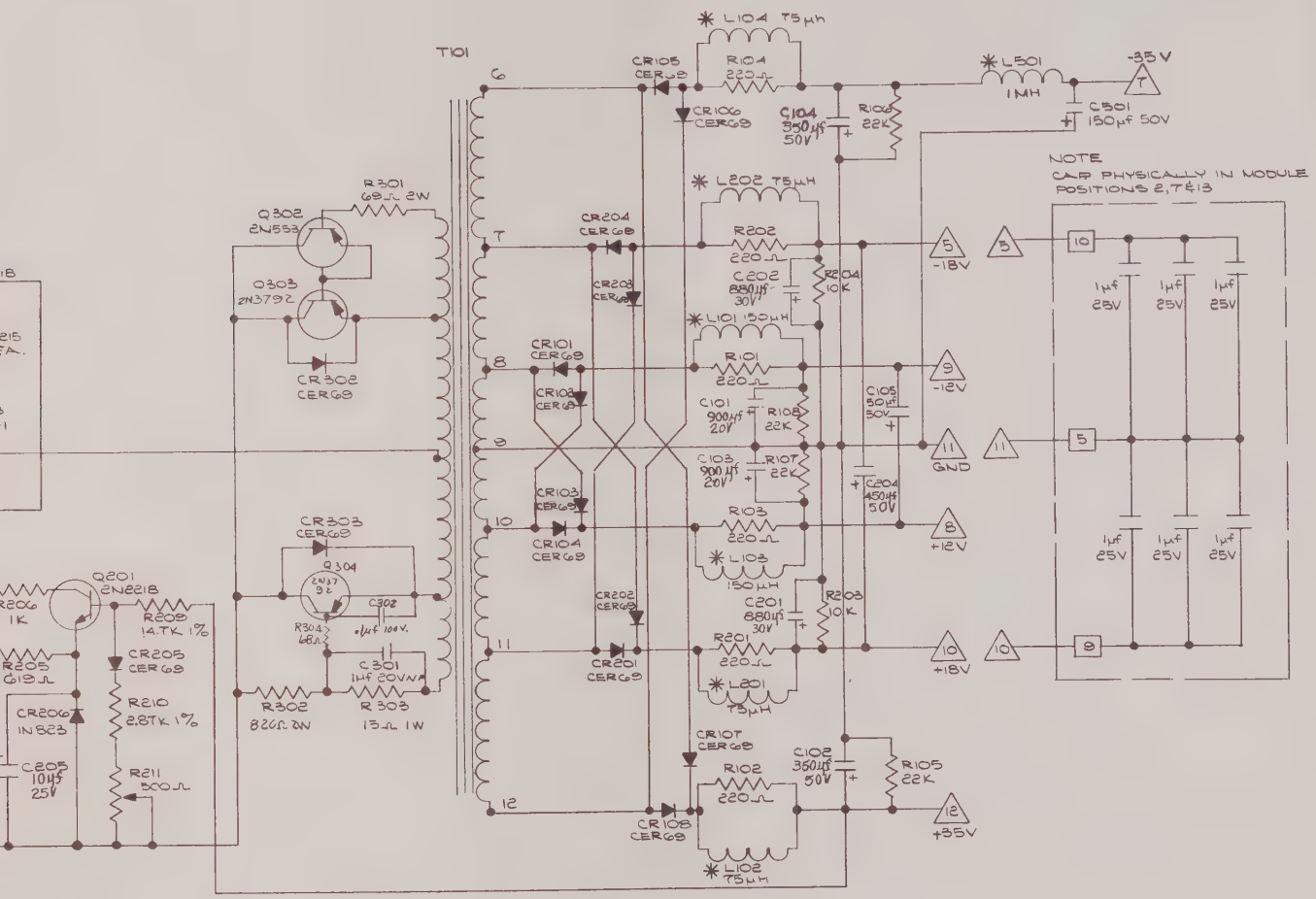
REVISIONS					
SYM.	DESCRIPTION	DATE	BY	CHK'D	APP'D
Q	REDRAWN & REV. PER CA 3047	10/4/65	JB	[illegible]	[illegible]
R	CA-3118-ADDED NOTE 6	1/19/65	P.I.	[illegible]	[illegible]
S	CA-3363-CHG'D VALUE OF C209 FROM 150/12 TO 220/25	11/4/66	P.I.	[illegible]	[illegible]
T	CA-3313-1 CHG'D Q205 TO 303930 & R232 AND R233	[illegible]	P.I.	[illegible]	[illegible]
U	CA-3479-ADDED C302 .1 μF, 100V	10/29/68	J.F.	[illegible]	[illegible]
V	CA-3671 CHG'D CAP. VALUES	3/31/69	[illegible]	[illegible]	[illegible]
W	CA-4735 CHG. RES VALUE	9.17.68	JB	DR	DR



NOTES:

1. ALL RESISTORS AB, EB, ½W UNLESS OTHERWISE NOTED
2. MATING CONNECTOR TO DP IS CONNECTOR DPX-25C3-3
3. OUTPUTS APPEAR AT CON MARKED △
4. MASTER BOARD PIN CON
5. C651 USED FOR R.F.I. AS RE
6. ✱, FOR WINDING INFORMATION U
   - BA-014475 — L101 & L10
   - BA-014477 — L102, L10
   - BA-014476 — L501
   - BA-012964 — L601 & L

REF	DESCRIPTION	QTY



NOTE

THIS DRAWING TO BE USED ONLY WITH UNITS HAVING SUFFIX 'B' IN SERIAL NO.

0%

-25C3-34P(J13)
S(P15) MARKED ◯
ECTOR # RF11224(P16)

JECTIONS MARKED □

D.

E DRAWINGS AS FOLLOW:

,L201 & L202

02

SYMBOL	ITEM	DWG No	DESCRIPTION	QTY / ASSY

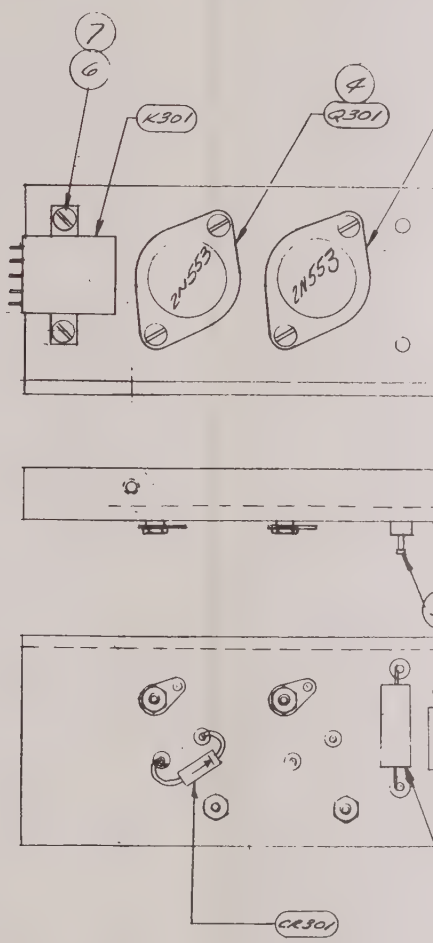
DATA-CONTROL SYSTEMS, INC.

TITLE: SCHEMATIC POWER SUPPLY MODULE ASSEMBLY

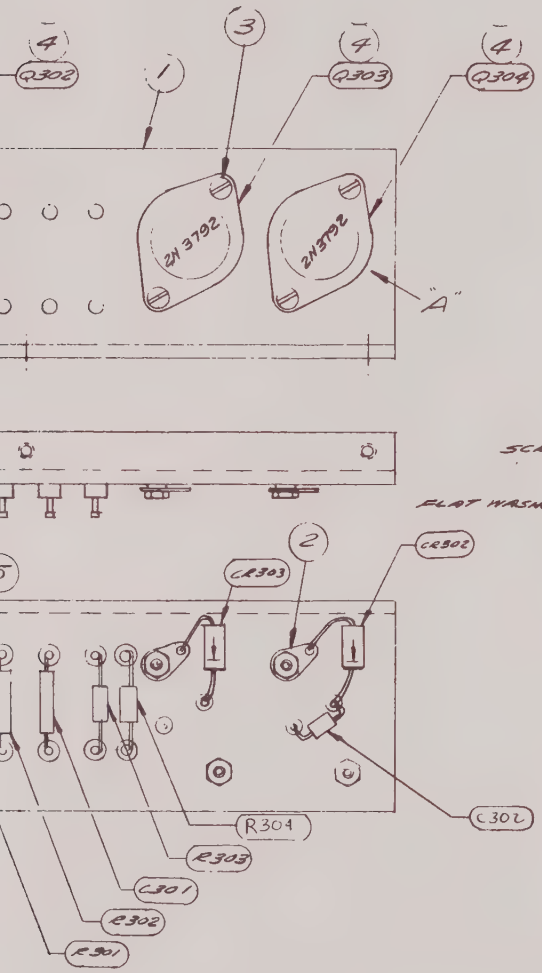
TOLERANCE	SCALE	DATE	DO NOT SCALE DRAWING
DEC = .005 FRAC. 1/64 ANG. ±0° 30'	DWN. RB	10/6/65	MAT'L
NOTE: BREAK ALL SHARP CORNERS	CHKD.	10/6/65	FINISH
	PROJ. ENG.	10/6/65	MODEL GMA-1/S DW-010873 REV W
	NEXT ASSY	CM ENG	

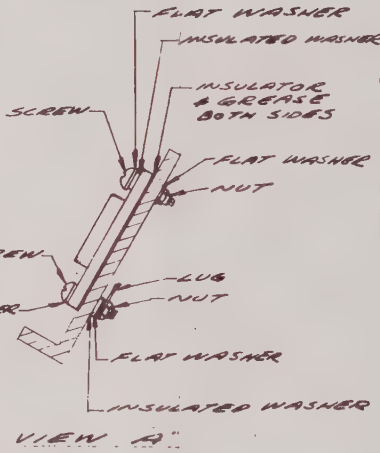
GMA-1/S FIRST PRODUCT | NEXT ASSEMBLY | QTY / ASSY

REV.	ZONE	DESCRIPTION	DATE	DWN.	CHK
01	~	CHANGED PER CA 1625	3-3-63	Chg	
C	~	CA-2255-REVISED PER C.A.	3-6-64		
D	~	CA-3325-CHG'D LOCATION OF CR301	9/10/64	P.T.	
E	~	CA-3313-1 CHG'D COMP. ADDED R304	3/12/66	P.T.	
F	2	CA-3979-ADDED C302, .1μf, 100V	11/29/66	PT	



REF	DESCRIPTION	QTY





VIEW "A"

ITEM	SYMBOL	DWG. NO.	DESCRIPTION	QTY. / ASSY.
1		BC-010518	HEAT SINK	1
2			HARDWARE KIT, # TC74775 (LESS SCREWS)	4
3			SCREW #4-40 NC2A x 3/16 BHMS, STL CAD PL	8
4			GREASE, SILICON	A/R
5			STANDOFF, SEALECTRO #ST-5M-22 TUR.	10
	Q301		TRANSISTOR, DELCO, #2N553	1
	Q302		TRANSISTOR, BENDIX, #2N553	1
	Q303		TRANSISTOR, MOTOROLA #2N3792	1
	Q304		TRANSISTOR, MOTOROLA #2N3792	1
	K301		RELAY, GE #35279/G200F9	1
	CR301		DIODE, SOLITRON, CR69	1
	R301		RES, AB, HB, 2W, 10% 68Ω	1
	R302		RES, A.B, H.B, 2W, 10%, 820Ω	1
	R303		RES, AB, GB, 1W, 10% 15Ω	1
	C301		CAP, SPRAGUE, 15TD, 30V, 20% NON POLARIZED 1MF	1
	CR302		DIODE, SOLITRON, CR69	1
	CR303		DIODE, SOLITRON CR69	1
6			SCREW, #4-40 NC2A x 5/16, BHMS, STL CAD PL	2
7			LOCKNUT, FLEXLOC, #21FA-440	2
	R304		RES. AB, ED. 1/2 W, 10% 68Ω	1
	C302		CAP, RMC. 100 V, .1μF	1

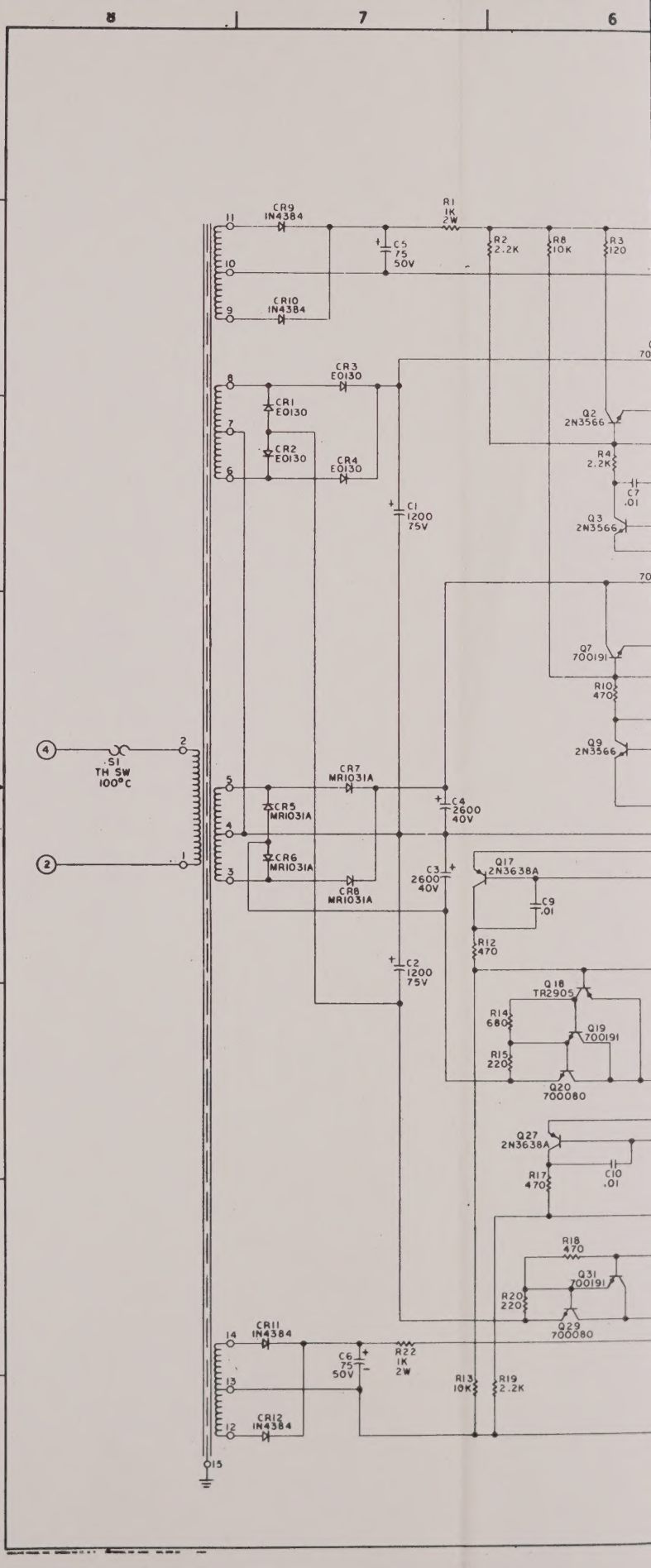
CA-010519

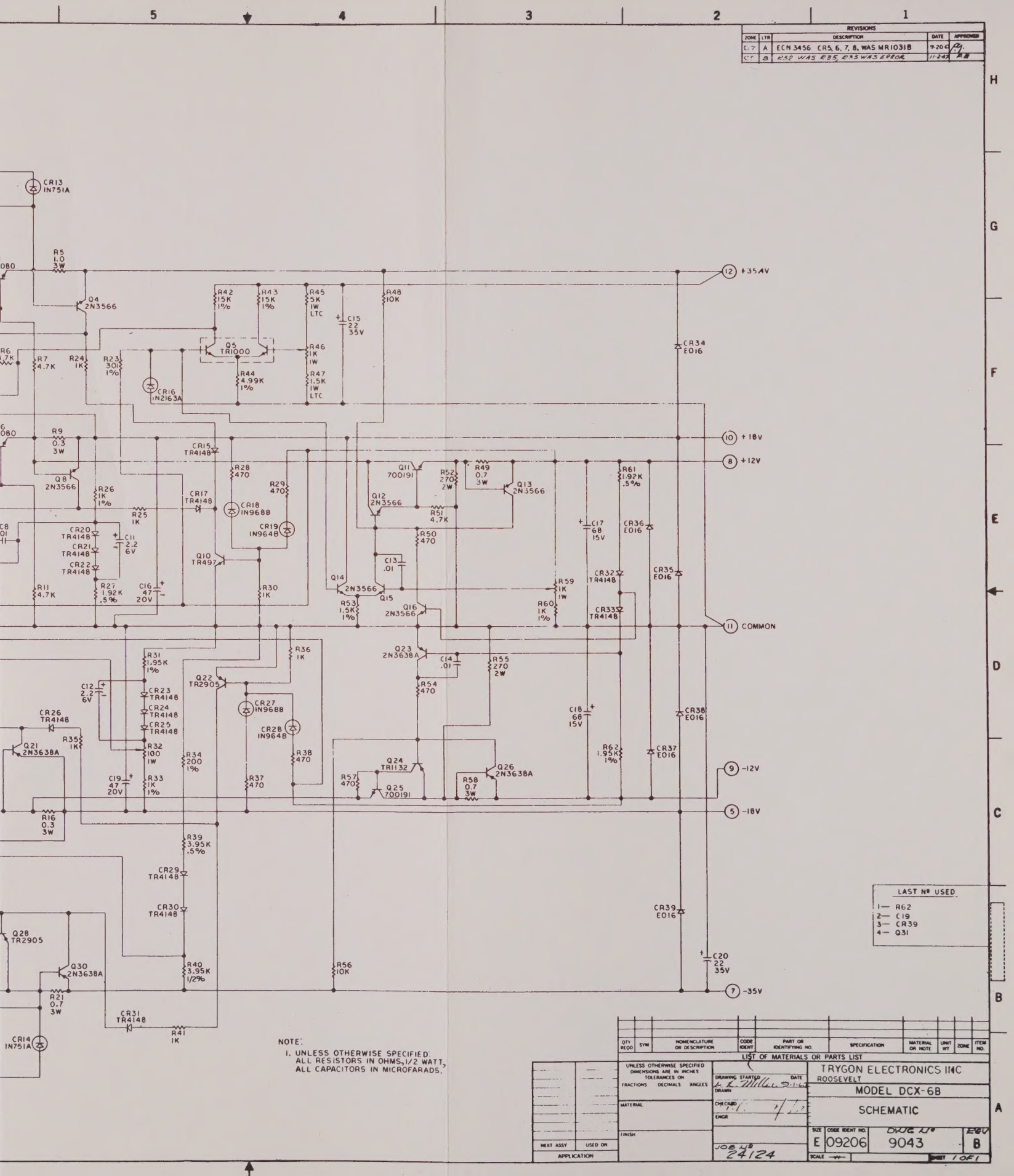
DATA CONTROL SYSTEMS, INC.

TITLE: HEAT SINK ASS'Y. TRANSISTOR

TOLERANCES: UNLESS OTHERWISE SPECIFIED			DO NOT SCALE DRAWING
DECIMAL - 3 PLACE ± .003	DWN. RWG	DATE 1/6/63	
DECIMAL - 2 PLACE ± .010	CHKD. [illegible]	1-16-63	MAT'L
FRAC. ± 1/64 ANG. ± 0°30'	ENG. [illegible]	1/16/63	FINISH
FLATNESS WITHIN ~ TIN.	APP. [illegible]	1/16/63	CA-010519 REV. F
FRACTIONAL HOLES ⌀ ± 1/64	SCALE 1:1		SHEET
NOTE- BREAK ALL SHARP CORNERS .005"-.015"			
SURFACE ROUGHNESS NOT TO EXCEED			

PRODUCT	NEXT ASSEMBLY	QTY. / ASSY
SMA-1/5	TA-010520	1


8
7
6
H
G
F
E
D
C
B
A
CR9 IN4384
CR10 IN4384
CR11 IN4384
CR12 IN4384
R1 1K 2W
R22 1K 2W
C5 75 50V
C6 75 50V
R2 2.2K
R8 10K
R3 120
R4 2.2K
R10 470
R12 470
R17 470
R18 470
R20 220
R14 680
R15 220
R13 10K
R19 2.2K
C7 .01
C9 .01
C10 .01
C1 1200 75V
C2 1200 75V
C3 2600 40V
C4 2600 40V
CR3 E0130
CR1 E0130
CR2 E0130
CR4 E0130
CR7 MR1031A
CR5 MR1031A
CR6 MR1031A
CR8 MR1031A
S1 TH SW 100°C
Q2 2N3566
Q3 2N3566
Q7 700191
Q9 2N3566
Q17 2N3638A
Q18 TR2905
Q19 700191
Q20 700080
Q27 2N3638A
Q31 700191
Q29 700080


REVISIONS
ZONE LTR DESCRIPTION DATE APPROVED
C7 A ECN 3456 CR5, 6, 7, 8, WAS MR1031B 9-20-6
C7 B R52 WAS R35, R35 WAS ERROR 11-24-6
CR13 IN751A
R5 1.0 3W
Q4 2N3566
R42 15K 1%
R43 15K 1%
R45 5K 1W LTC
R48 10K
C15 22 35V
Q5 TR1000
R46 1K 1W
R44 4.99K 1%
R47 1.5K 1W LTC
CR16 IN2163A
R7 4.7K
R24 1K
R23 301 1%
R9 0.3 3W
CR15 TR4148
R28 470
R29 470
CR17 TR4148
CR18 IN968B
CR19 IN964B
Q8 2N3566
R26 1K 1%
R25 1K
CR20 TR4148
CR21 TR4148
CR22 TR4148
C11 2.2 6V
Q10 TR497
R11 4.7K
R27 1.92K .5%
C16 47 20V
R30 1K
Q11 700191
R52 270 2W
R49 0.7 3W
Q13 2N3566
Q12 2N3566
R51 4.7K
R50 470
C13 .01
Q14 2N3566
Q15
Q16 2N3566
R53 1.5K 1%
R59 1K 1W
R60 1K 1%
R61 1.92K .5%
C17 68 15V
CR36 E016
CR32 TR4148
CR35 E016
CR33 TR4148
CR34 E016
12 +35V
10 +18V
8 +12V
11 COMMON
9 -12V
5 -18V
7 -35V
R31 1.95K 1%
C12 2.2 6V
Q22 TR2905
R36 1K
CR23 TR4148
CR24 TR4148
CR25 TR4148
CR27 IN968B
CR28 IN964B
R32 100 1W
R34 200 1%
R33 1K 1%
C19 47 20V
R38 470
R37 470
Q23 2N3638A
C14 .01
R55 270 2W
R54 470
Q24 TR1132
Q25 700191
R57 470
R58 0.7 3W
Q26 2N3638A
C18 68 15V
CR38 E016
R62 1.95K 1%
CR37 E016
CR26 TR4148
Q21 2N3638A
R35 1K
R16 0.3 3W
R39 3.95K .5%
CR29 TR4148
CR30 TR4148
Q28 TR2905
Q30 2N3638A
R40 3.95K 1/2%
R21 0.7 3W
CR31 TR4148
R41 1K
CR14 IN751A
R56 10K
CR39 E016
C20 22 35V
LAST Nº USED
1— R62
2— C19
3— CR39
4— Q31
NOTE:
1. UNLESS OTHERWISE SPECIFIED:
ALL RESISTORS IN OHMS, 1/2 WATT,
ALL CAPACITORS IN MICROFARADS.
QTY REQD SYM NOMENCLATURE OR DESCRIPTION CODE IDENT PART OR IDENTIFYING NO. SPECIFICATION MATERIAL OR NOTE UNIT WT ZONE ITEM NO.
LIST OF MATERIALS OR PARTS LIST
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS DECIMALS ANGLES
MATERIAL
FINISH
NEXT ASSY USED ON
APPLICATION
DRAWING STARTED DATE
DRAWN
CHECKED
ENGR
JOB Nº 24124
TRYGON ELECTRONICS INC
ROOSEVELT
MODEL DCX-6B
SCHEMATIC
SIZE E
CODE IDENT NO. 09206
DWG Nº 9043
REV B
SCALE —
SHEET 1 OF 1